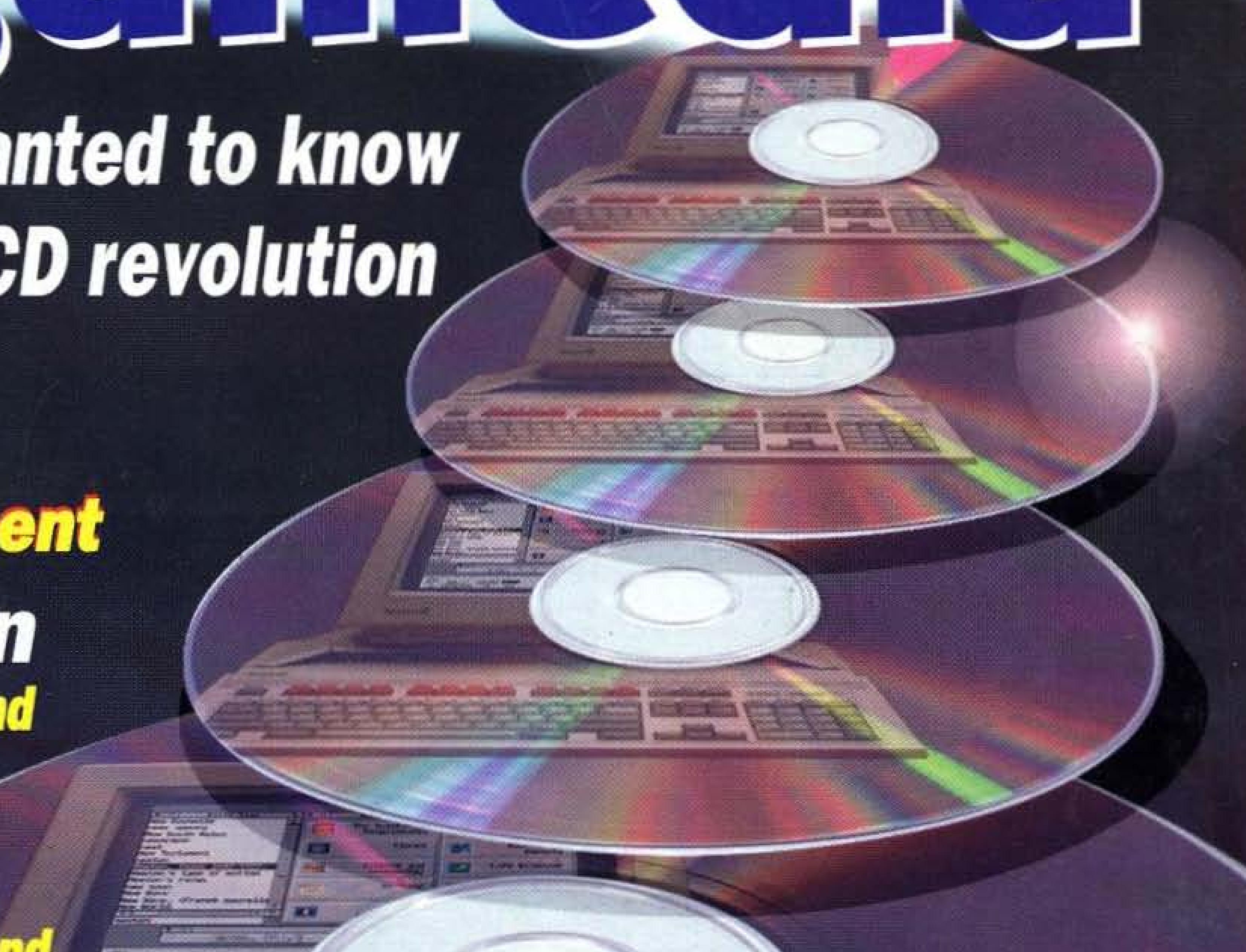
THE MICRO USER

Volume 10 Number 4 June 1992 £1.95

INSIDE
Essential Archimedes
Packed full of hints and tips

Megamedia



Everything you wanted to know about the digital CD revolution

Plus

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Ooh-la-la

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On test

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floptical
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THE DISCS are interchangeable so realistic, unlimited storage capacity is available for floppy disc drive users for the first time.

THE DRIVE is also capable of formatting the normal double and high density discs to its own format so you can also utilise your existing discs. By using Morley Electronics own SCSI interface card and software the drive appears on the icon bar as a hard disc drive and can then be used to store data just as with a hard or floppy disc.

DATA can be copied to and from other drives just as you would normally and all of the usual RISC OS functions can be carried out.

WE BELIEVE that this drive represents the next step forward in data storage and are offering the drive complete with our own SCSI interface card at the following prices.

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External 21MB Mechanism	£499.00
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Please state computer type when ordering
Mechanism prices include SCSI Interface card, software, all cables and case, manuals and one 21MB Floptical disc.

MORLEY
E·L·E·C·T·R·O·N·I·C·S · L·T·D

Hard Disc Drives

Morley Hard Disc Drives and interfaces are now renowned throughout the Acorn community. A combination of the fastest and most compatible interface available, together with high quality drive mechanisms means you can be confident that you are making an investment for the future.

The interface card is fully Acorn compatible and is the only ANSI level 1 & 2 compliant card on the market. It works with amongst others Fujitsu, Rodime, Quantum, Miniscribe and Connor hard disc drives as well as Wangtek tape streamers, Morley's own removable hard discs, Computer Concepts Scanlight Professional and is guaranteed to work with any ANSI compliant SCSI device. The card can give sustained data transfer rates of up to 4MB per/s. It is also fully compatible with RISC-OS 2 & 3 and fits the A3000, 300, 400, 540 and the new A5000 so when you upgrade machines you can hang on to your hard disc without any problems. If you already have a hard disc inside your computer but would like to have the benefits of a SCSI drive,our card lives quite happily alongside any existing ST506 or IDE interface.

A3000 Fixed Hard Discs	
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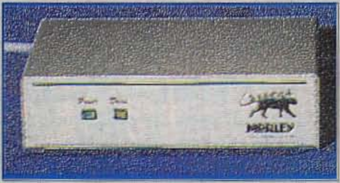
100MB	£499.00



A300*, A400 & A5000 Fixed Hard Discs	
52MB	£299.00
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Other SCSI devices

Removable Cartridge Hard Disc	
44MB mechanism	£575.00
90MB mechanism	£775.00
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90MB Cartridge	£109.00

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150MB tape streamer	£799.00
150MB tapes	£29.00

All prices include standard interface card, all necessary software, cables and cases. and one tape/disc where appropriate. For cached interface card please add £50.00.

*Please note that 300 series computers require both a MEMC1A upgrade and a backplane to be fitted. Both available from Morley please call for prices.

Memory Expansion

Morley memory expansion boards for the A3000 are high quality four layer boards and unlike most other cards can be expanded at a later date for maximum flexibility.

A3000 1MB Non-Exp	£59.00
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1MB to 3MB upgrade	£145.00
305 1/2 MB	£69.00
400 series per 1MB	£50.00

Analogue & User Port

Full specification BBC analogue & user port for the A3000. The analogue port is accessable using ADVAL from BASIC 5 with all BBC OSbyte calls supported. As supplied to Acorn Computers for their special access A3000.

Analogue & User Port	£59.00

Sparkle

Sparkle is a RISC OS compliant control package for the A3000 and Archimedes allowing full control of input, output and motor devices via most control boxes. Effectively Sparkle introduces the user to the world of control through a simple language which gives full access to control boxes as well as the ability to carry out data and frequency logging via analogue equipment. Inputs and outputs are simulated on screen and the package includes full counting and timing facilities. Numerous examples are included as are various exercises. Sparkle can control Deltronics, Phobox and Andi-Oddule control boxes as well as being the LEGO® dacta recommended control software for their Interface A control box. Please state control box when ordering.

Sparkle	£59.00
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*(Adapter needs to be sent to Morley)

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Morley's demonstration room.

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THE MICRO USER

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LET'S COMPUTE!

Simple sections that teach you the basics of computer programming

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✱ Undaunted, the daring duo dash on with yet another way of creating animations

Safe Scientist 92
✱ The nutty Professor gets into a twist with his ORs, ANDs and NOTs.

✱ This symbol indicates that the feature contains at least one full length listing for you to key in on your micro. All programs for your machine are on the subscribers disc.

Get it right ✓ All the major listings in this magazine are accompanied by checksums to help you key them in correctly.
For full details of how to use them see the article on Page 86 of the February 1992 issue

CD-Rom spectacular

Step into the future with this amazing look into what's available in the world of CD-Roms – what it's all about, the hardware you need and which software you can get your hands on. Everything you need to know is here in our complete five-page guide starting on Page 21.

CLAIM YOUR GAME

For this month only...

Subscribe now to The Micro User and you can claim a superb game absolutely FREE. See Page 12 for details.

JUNE SUBSCRIBER DISC

This month's 8-bit BBC disc contains all the listings from this issue. The Archimedes disc has the listings plus some superb PD software including:

THE MICRO USER
THE MICRO USER

- Inertia screen editor
- Great Rave demo
- Lots of brilliant utilities

To find out more about how to get your very own disc each month, turn to Page 12.

COMPETITION

This is your chance to win a fantastic CD-Rom drive and SCSI interface to go with your Acorn 32-bit micro. Turn now to Page 29

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is open on Page 100
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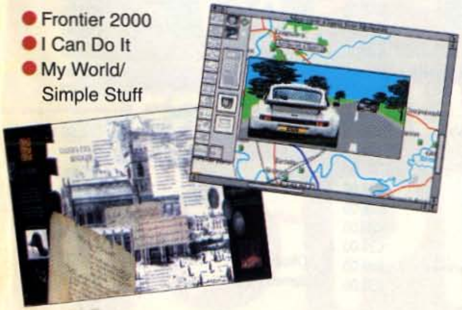

ESSENTIAL

Make your learning curve even easier with our three how-to-do-it series for all 32-bit owners:

Desktop Publishing.........59
Illustrating how pictures can make all the difference on your page.

Spreadsheets..................62
How using macros can make your life easier when repeating actions.

Computer Aided Design...........65
Turning ideas into pizza boxes is a piece of cake – Cowabunga!

NEXT MONTH IN THE MICRO USER

Reviews and previews of the latest graphics packages, DTP and CAD in the Essential Archimedes, and lots of arty programs and resources in the money saving PD pages.

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Phone lines open :-
Mon - Fri 09.00 - 17.00
Sat 10.00 - 17.00

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A3000 c/w 2Mb Ram fitted	£599.00
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Midi Expansion Card	£65.00
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* comes with free VIDC enhancer.

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4 Mation

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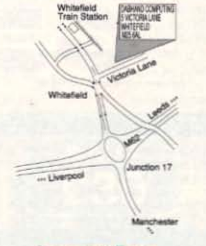

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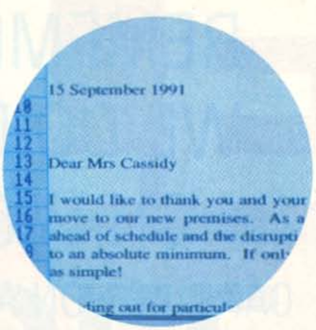

15 September 1991

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ahead of schedule and the disrupti
to an absolute minimum. If onl
as simple!

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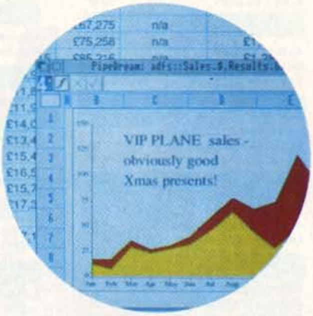

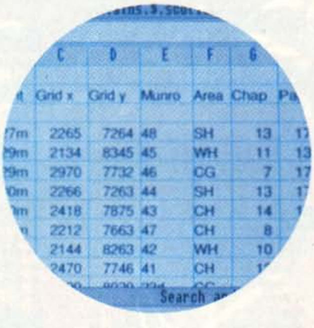

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9m	2970	7732	46	CG	7
0m	2266	7263	44	SH	13
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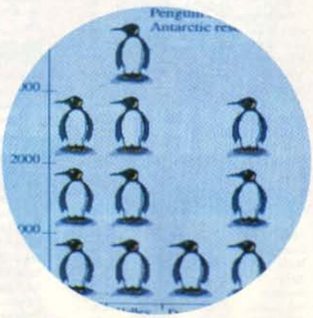

NEWS BEAT

CD Rom initiative

CUMANA and Acorn have worked together closely over the years and this partnership has born new fruit with the launch of Acorn's A5000 and CD Rom Special Offer.

Cumana have developed a CD Rom drive especially for this offer and the CAA 532 is not available separately. The system comprises the latest in hardware and software and costs an incredible £1,799. Usually the complete package would cost £2,770.

In addition A3000 owners can add the same CD Rom, software and vouchers to their system for £599 from July 1. Unfortunately, both offers are only open to education.

The solution is aimed at the first time user and so has been designed to be a simple matter of plug in and go. The seven CD Roms are suitable for education or home and form a substantial part of this offer.

They include Revelation 2, a Space Encyclopedia, Hutchinson's Encyclopedia as well as The Times and Sunday Times Sampler – a CD Rom containing all published material from January to June 1991. Added to this you'll also get a a complete illustrated Shakespeare, all 60 Sherlock Holmes stories and an illustrated Holy Bible.

The hardware side includes an A5000 with 4Mb ram and 40Mb hard disc, a colour multiscan monitor, a Cumana CAA532 CD Rom, SCSI interface and utilities, and the latest PC Emulator. In addition there is a pair of mains powered stereo speakers, three CD caddies and a mouse mat.

If you need an added bonus, there is a £25-off voucher for a year's subscription to Neris – an educational resource database on CD Rom and a £30 voucher towards the Risc OS version of The Times and Sunday Times on CD Rom.

Back to school

BROAD Oak Computers (0279 718767) have added to their correspondence courses with a new range of weekend courses. These cover a wide variety of themes from programming in Basic and C to desktop publishing with Impression, using word-processors, spreadsheets and databases as well as introductory courses for new Archimedes owners and for those struggling with their PC emulator.

Course numbers are limited to three or four students to ensure a high degree of teacher-student contact. Lunch is provided and accommodation is optional.

Archimedes day

THE University of Sussex is holding an Archimedes Day on Thursday July 2 for school and college teachers. The aim is to increase the awareness of the potential of the Archimedes in education with an emphasis on maths and statistics. Registration information can be obtained from Dr D. R. Robinson (0273 606755 ext 3008).

Colour scan service

INVESTING in a scanner, laser or inkjet printer can be expensive – especially if you want a colour option. BirdTech (0263 70669) in Norfolk provide a scanning and printer service for the Archimedes.

Their scanning is all done by a Sharp JX100. A 100dpi colour scan – for medium or low resolution screens – will cost you 50p each while 200dpi scans are priced at 60p for colour and 40p for 256 greyscale scans. The maximum size of a scan is 100mm x 160mm and files can be compressed using Compression from Computer Concepts if needed.

The output side of the operation consists of a Hewlett-Packard PaintJet 500C or a Laser Direct 600 x 600dpi mono print. This costs 45p and 20p respectively per A4 sheet.

The mouse is out

MOST people will have encountered some difficulties using a mouse to trace drawings or map contours accurately. TechSoft (08243 318) have developed the HandiPad digitising tablet to replace the Archimedes' mouse in such applications.

Rather than a mouse you use a puck on a tablet. The puck's position always corresponds to the cursor position on the screen and the cross hairs are ideal for accurate tracing. For a more traditional drawing action you may prefer the pen-like stylus.

This is a superb point and touch tool when combined with pre-printed overlays and has found a use in special needs applications. The HandiPad has an active area of 12in x 12in with a transparent overlay sheet to place drawings under.

The hardware comes with sophisticated mouse emulation software. A unique feature is that both mouse and tablet can be active at the same time. A zoom mode is especially useful when tracing a small drawing, for instance, and is accessed by clicking a fourth puck button making the drawing fill the screen. The full package costs £175.

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Steve Turnbull,
Editor, *The Micro User*

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YOU MUST ACT FAST

For the BBC Micro we have all the type in listings from this issue plus some great animations by Mike Goldberg.

For the 32 Bit Machines the screen editor for Inertia a really funky demo, Dook and two fun games as well as all listings for your computer and the 8 bit machines.

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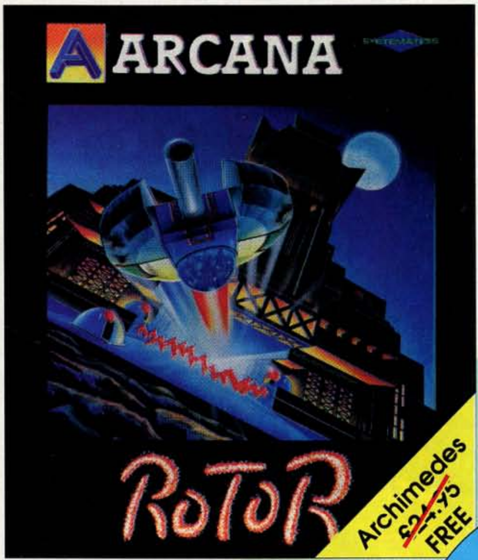

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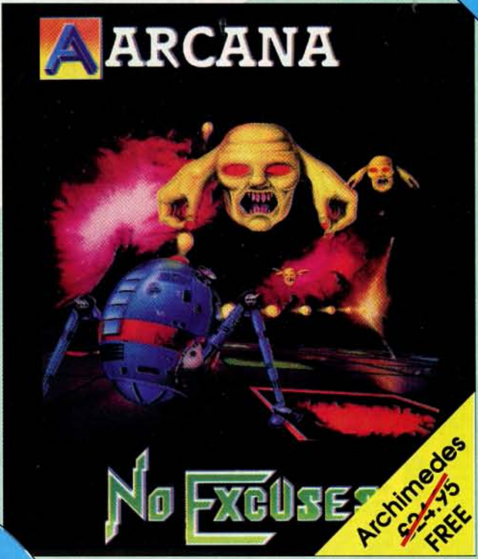

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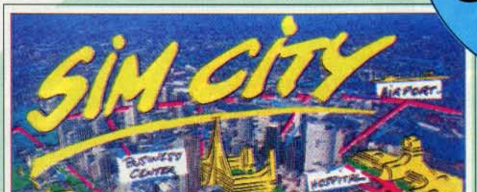

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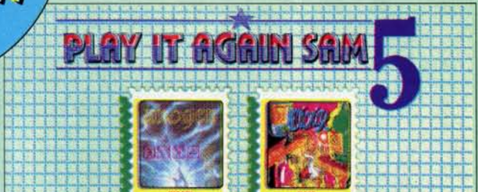

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ELIXIR
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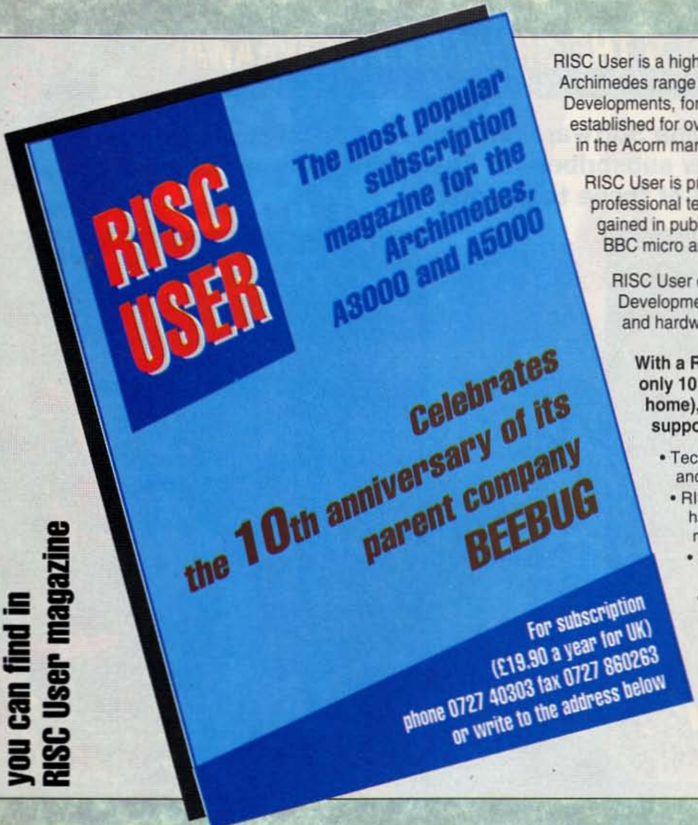

RISC USER

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Celebrates the 10th anniversary of its parent company BEEBUG

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RISC User is a high quality magazine devoted totally to the Archimedes range of computers. It is published by RISC Developments, formed last year from BEEBUG, which has been established for over ten years as one of the foremost companies in the Acorn market.

RISC User is produced by a dedicated and enthusiastic professional team which benefits from10 years of experience gained in publishing the popular BEEBUG magazine for the BBC micro and the Master 128.

RISC User can also call upon BEEBUG's (now RISC Development's) considerable expertise as a major software and hardware developer for the Archimedes range.

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Following glowing reviews in the computer press ...

... a new version of **DeskEdit** *(V 1.20)*

has now been released

with even more features for text editing and word processing tasks, Basic and C source editing

Acorn User
...offers much to the user... a good deal of thought has evidently gone into its development...
... a worthwhile upgrade from Edit

Archimedes World
...replete with well thought out and flexible features... very attractive... remarkably inexpensive for what it offers... should prove very popular.

Archive
...a wonderful piece of software... deserves to be on everyone's icon bar... Acorn would do well to provide it free with every machine it sells... so much (is provided) that you wonder how you managed before.
...macros are...a boon and of great value when writing a program... a truly marvellous set of page and printer control options are included... Everything I wanted was there with clear instructions for use.DeskEdit is a must.

A new ***single key save-and-run feature in Basic mode*** permits virtually instantaneous testing of programs and applications as you edit them.

The ***improved procedure and function browser*** now lets you browse in both directions

In text mode, ***wordwrap control*** is improved, while in ***C mode syntax checking*** is extended, and a special Search option lets you search for function definitions.

Other ***new features*** are: • dynamic date insertion • Left and Right Justify • bracket matching • Align Columns and • the Char Info option.

DeskEdit

is the ultimate all-purpose editor for the Archimedes, with special features for plain text, Basic and C source.

Edit your Basic programs on the desktop and test them interactively with a single key press.

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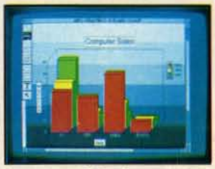
Acorn User
...ChartWell: simple but effective.

ChartWell scores on simpler controls over the basic graph types. It also has enough effects to present material prettily at a price that makes it attractive to the home or school user.

...All the options chosen can be saved in a 'Style Sheet file which makes it remarkably easy to create the same type of graph again...

Archive
...This program from RISC Developments uses a really clever approach exploiting the desktop philosophy to the full.



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Stretching the frontiers

THE need to transfer images from real-life to a computer has caused many a headache over the years. Canon's Ion cameras have alleviated this problem. The latest in the range, the Canon Ion RC560, was put through its paces at the most recent Ideal Home Exhibition by Cambridgeshire Software House (0480 67945).

CSH had discovered the need for such a system two years ago when they began the development of Frontier 2000 – their latest education package based around the Carlisle area – which uses photographs of archealogical and historic features. CSH developed their ColourMaster software to manipulate the images whatever their origin.

Ion cameras capture images on small reusable and interchangeable floppy discs allowing high resolution images. The RC560 lets you choose maximum image resolution or maximum storage capacity. Using double density mode up to 25 images can be stored on each floppy, each picture being taken twice and then interlaced to give a double density frame.

Their experience bore fruit not only with Frontier 2000 but with three systems available for the Archimedes, PC and Macintosh. There are three levels of entry for all operating systems: Basic, Standard and Professional.

For the Archimedes range the Basic ColourMaster Imaging System consists of a Canon Ion RC260 and a full colour digitiser for £795. At £925 the Standard system is the best seller and comprises the Basic kit plus a 35mm slide adaptor. For a full blown professional system £2,250 will buy you a Canon RC560 camera, full colour digitiser, 35mm slide adaptor and an infra-red wireless controller.

Solid silicon improves on presentation

SOLIDTools from Silicon Vision (081-861 2173) has a newly launched version 4.0 with improved presentation and productivity.

The major upgrade to SolidCad 4, FilmMaker 4 and Realtime Solid Modeller 4 is a high-speed texture mapping facility for surface finishes. A full-screen texture mapped image can now be generated in less than two seconds even for complex screens.

This allows instant realism to be added to designs. Teak, oak, mahogany, marble, brick, stone or tile effects can enhance your creations. All the texture sprites can be scanned or painted in a 256-colour art package and them imported into SolidTools.

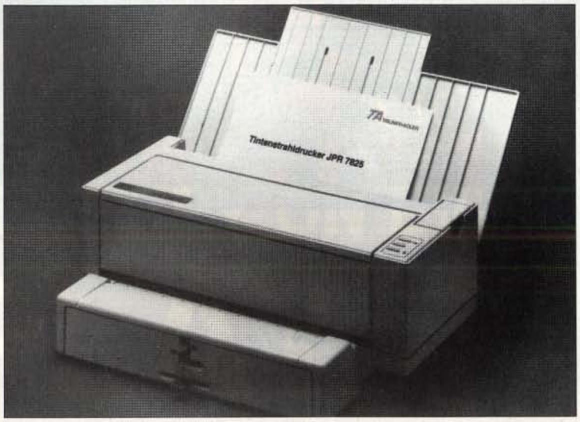
SolidTools costs £125 and SolidCad and FilmMaker have been extended to create 24-bit RGB data in addition to the standard 8-bit colours. This allows the use of diffusion and colour mixing to generate high quality standard colour images. SolidCad also supports drawfiles which improve the integration potential with 2D packages.

Sub-£350 inkjet

TRIUMPH Adler (0206 845251) have added a second model to their range of inkjet printers – the JPR 7825.

Compact and lightweight – measuring only 342x115x147mm with a weight of 2.9kg – it is very quiet and has a virtual resolution of 600x300 dpi. The 50-nozzle printhead has its own sealed ink supply with an estimated print life of 500,000 characters in letter quality mode.

The JPR 7825 emulates the Epson FX-850 and it can handle a variety of different types of paper. The standard model has a semi-automatic front loading sheet feeder with an optional 150-sheet automatic paper tray. The price is £345.



Online/CD Rom Information '92

A DIARY date for people interested in all aspects of CD Rom publishing is the Online/CD Rom Information '92 show. Due to increased demand the organisers, Learned Information (0865 730275), have moved the venue to the Ground and First floors of Olympia 2 in Kensington.

The exhibition will take place from 8-19 December and over 100 companies are already committed to demonstrating their wares.

Value for money

STATE of the Arc have moved from the world of public domain to enter the commercial scene. Their aim is to release an increasing number of top quality, budget programs for the Archimedes. Their first game is Nosher which costs only £6.50. This arcade game is of the *Pac-Man* style with 256 colour graphics and stereo sound over 20 levels.

The plot is a familiar one: An evil scientist, a world threatening event and a hero. Your job as the sole survivor of the Nosher race is to succeed where others have failed.

On a more serious note their second release is Carousel. This is a screen sequencer which allows you to display 256-colour Mode 13 screens in a variety of ways. This applications sits on your desktop and lets you group screens together, assign fades and create a standalone program which others can access.

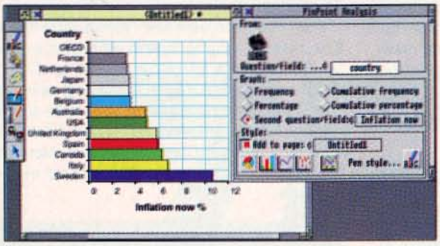
Because screens are compressed you can pack more on to a disc and move from one to another with shutter, blind, pixel, colour, interlace and bounce fades. Carousel costs £6.50.

State of the Arc are looking for more programs and writers, musicians and graphic artists to create a broad base of budget software. If you are interested you can contact them at: State of the Arc, 29 West Lea Drive, Tingley, Wakefield WF3 1DH.

LONGMAN
LOGOTRON

PinPoint

> The ease with which data collection may be organised and implemented is a joy.
>
> **Frank Jukes, Micro User, January 1992**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PinPoint Analysis
Frequency
Cumulative frequency
Percentage
Cumulative percentage
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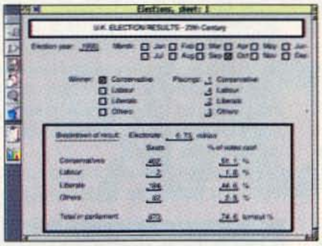
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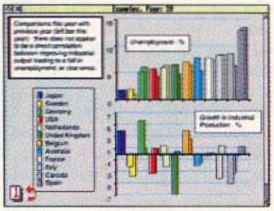
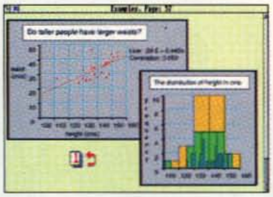
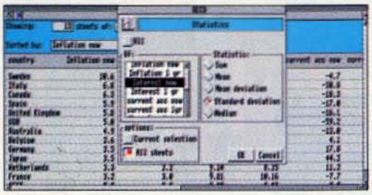
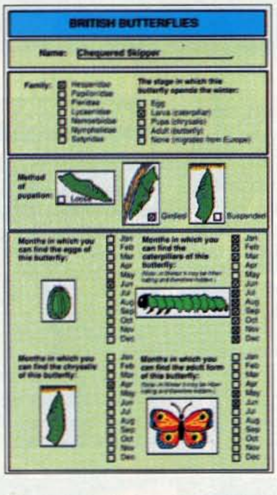



Do taller people have larger waists?

> *PinPoint* is certainly a new generation database, making the handling of data as easy as it should be. Its concept and execution is brilliant — data handling is about collecting data efficiently, and that is what *PinPoint* does. *PinPoint* is powerful yet simple to use and will take educational data-handling into a new era.
>
> **Dave Futcher, BBC Acorn User December 1991**


Statistics


BRITISH BUTTERFLIES
Name: Chequered Skipper
Family:
Method of pupation:
Months in which you can find the eggs of this butterfly:
Months in which you can find the caterpillars of this butterfly:
Months in which you can find the chrysalis of this butterfly:
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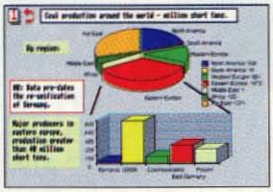

Coal production around the world - million short tons

> Has Longman Logotron developed a new form of database altogether? In one word yes. To call *PinPoint* a mere database, or even mildly more boastful, a new generation database, is to diminish what in truth is a revelation.

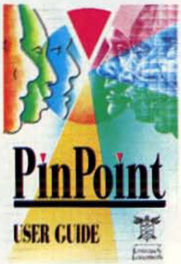
> The scope and variety of *PinPoint* is quite astonishing. The sheer variety, the power, the complexity of this program is astounding. The analysis and display aspects are both powerful and attractive enough to operate in both an educational and business environment. Databases will never be the same after this.
>
> **Duncan Evans, Archimedes World December 1991**

> *Pinpoint* takes databases into a new dimension in several ways. First, form design. *PinPoint* is about as adaptable as the best desktop publishing package when it comes to creating the form upon which information will later be entered and stored.

> When its abilities to produce statistics, charts and diagrams (with more ease and speed than I would have believed possible), and to print the results in attractively designed page format is considered too, then it becomes an essential purchase for anybody wishing to collect, analyse and present information.
>
> **Chris Davies, Times Educational Supplement, November 1991**

Longman Logotron
124 Science Park
Milton Road
Cambridge CB4 4ZS.

Tel. (0223) 425558
Fax (0223) 425349


PinPoint
USER GUIDE

PinPoint for the Acorn Archimedes is priced at £99. A Site Licence costs £400.

JUNIOR
PinPoint
A Child's Guide to Data Handling
LONGMAN LOGOTRON

A special version for primary schools is priced at £24. A Site Licence costs £72.

Acorn Open Days

Acorn and dealers hold regular Open Days all over the country throughout the year. Look out for the ones in your area, it's your chance to talk to Acorn themselves as well as a selection of hardware and software manufacturers.

Check your local press for full details or contact your Acorn dealer directly.

Date	Town
Sat 6 June	Norwich
Sat/ Sun 13-14 June	Belfast
Sat 20 June	Cambridge
Sat 27 June	Bournemouth
Sun 28 June	Newport (Isle of Wight)
Sat/Sun 12-13 Sept	Birmingham
Sat 19 Sept	Portsmouth
Sat 26 Sept	Blackpool
Sun 27 Sept	Oldham
Sat 3 Oct	Portsmouth
Sun 4 Oct	Sheffield
Sun 11 Oct	Rotherham
Sat 24 Oct	Swindon
Sun 25 Oct	Slough
Sun 1 Nov	Stoke on Trent
Sat 7 Nov	York
Sun 8 Nov	Northampton
Sat 14 Nov	Middlesborough
Sun 15 Nov	Hull
Sat 21 Nov	Watford
Sun 22 Nov	Luton
Sat 28 Nov	Derby
Sat 12 Dec	Bradford
Sun 13 Dec	Leicester

The Micro User editors will be in attendance at the highlighted shows

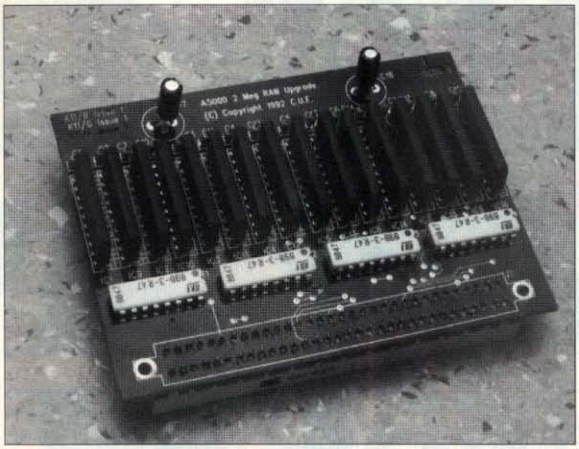
What's in a name?

VIDEO titling is now possible using your Archimedes thanks to Clares' Titler. This is made up of two applications, Titler and Sequencer, and both are compatible with Artisan, Artisan 2, Illusionist, and RenderBender II files, screens and animations as well as graphics files from Draw, Paint, Atelier and Euclid animations.

For sound you can load tracks from Tracker, Armadeus and as Modules. Titler aims to be versatile and flexible and is not just limited to video titling.

For anyone involved in presentations, Titler could be used as an alternative to OHP slides or to create standalone rolling demos, using sounds and music to emphasis a point or create an atmosphere. Indeed Titler is already used to produce programs for New Zealand Television.

You can buy Titler for £149.95, or £345 for a pack containing Titler and a Clares' Genlock card.



New memory upgrade

STOCKPORT-based CU Electronics (061-476 0576) have a new 2Mb memory upgrade for the A5000. Called the K11, it is a four-layer board using 16 high-speed ram devices.

No soldering is needed to fit the board as it plugs directly into the Archimedes. Priced at £95 it is a cost-effective option to improve your machine's memory.

Archie vs Mac vs PC

WHEN Paul Beverley at Norwich Computer Services did a price/performance comparison between the Apple Macintosh and Acorn Archimedes he couldn't believe what he found – so he employed two independent consultants to take a look as well.

What he found was that apart from the very high-end systems costing £20,000+, you can set up a DTP system based on the A5000 or A540 at roughly half the price of an equivalent Apple Mac set-up. What is more, it is faster, more effective and easier to use.

The results of Paul's research, plus other related information, have been published in a booklet *Desktop Publishing Using Acorn Computer Systems*.

You can get one copy free of charge from Norwich Computer Services, 96a Vauxhall Street, Norwich NR2 2SD, but if you want more than one they cost 75p each.

Lasers get the sack

OVER 250,000 people got the sack this month. Cartridge Care (0744 24915) have sent out thousands of sacks to laser printer owners. By recycling the toner cartridges they aim to save you money. Their basic price is £42.10 per cartridge, but they are prepared to beat any price if you ring them on 0800 252410.

Cartridge Care's programme director Richard Grace promises a no-quibble guarantee and that all cartridges are safely and effectively recycled by a process used widely in Germany and Switzerland.

Virus busters

A new service for Archimedes owners will now combat the threat of viruses. Run by Pineapple Software (081-599 1476) it is a commercial option when it comes to tackling the nasty beasts. However Pineapple stress that any charges are only to cover costs.

If you pay the annual registration fee of £24 you'll receive a disc with details of all known viruses together with a program developed under licence from Acorn to dispose of the beasts. Any virus killer is only as good as the frequency of its updates, and subscribers will be sent additional discs as new viruses are discovered.

Pineapple plan to set themselves up as a central point for collecting information about new viruses and information about previously unknown specimens should be sent to them clearly labelled.

Display Kit enhanced

PRIMEART from Minerva (0392 437756) has been enhanced with the release of the PrimeArt Display Kit. Priced at £12 it allows you to produce your own rolling displays from pictures produced using PrimeArt, ideal for presentations or open days.

The rolling displays are easy to create: Just drop saved pictures into the screens directory, click an icon and away it goes. You can use any sprite file but as PrimeArt compresses its pictures you can fit more on a disc.

In addition the new version of PrimeArt now has the option to use Model 21 for high resolution screens. This is of particular use to A5000 users who can now take advantage of the improved graphical capabilities of their machine because of the packaging of the multisync monitor with this Archimedes.

Schools will be particularly interested in some extra features in this release. PrimeArt now supports the Concept Keyboard and needs no adjustment as it automatically recognises when a keyboard is attached. This makes the program more accessible to pre-school and special needs pupils.

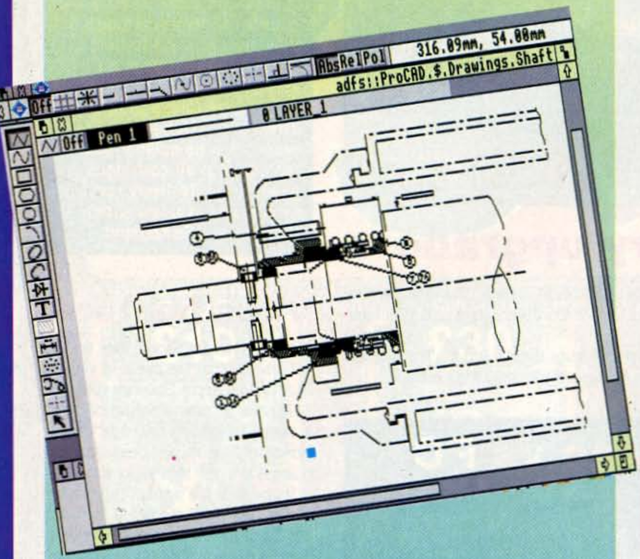
Other special additions are *sticky menus* and *brush latching.* If the sticky menus option is chosen menus stay on screen until an item has been selected, while brush latching lets a child click Select to start painting with a brush, clicking again to stop. This is particularly useful for children who have difficulty holding down the mouse for any length of time.

The new version retails for £79.95 but existing users of PrimeArt can upgrade for £10.

Minerva have also improved their Timetabler program. Now in version two this administration program for schools can be upgraded for £25 for a new manual and a host of new features.

FREEBIES

£250 of CAD software



MINERVA Software have just launched CADet for the Archimedes and there's a copy waiting for five lucky readers.

CADet is a CAD package aimed at school and home use, giving you the ability to draught designs in 2D with:

- Multiple drawings
- Automatic fillets
- HPGL Plotter support
- Drawfile import and export

Computer Aided Design with CADet gives you a maximum drawing size of A3 and it is very user friendly and Risc OS compliant.

It is easy to zoom and pan to get the best impression of your work and you can define your own zoom frames which are stored in each drawing file.

You have eight pens at your disposal in a range of colours and there is a wide range of line types including thick, parallel, broken and parallel broken.

For the less experienced there are on-screen prompt messages and on-line help.

Text manipulation is an important part of a CAD package and CADet lets you have text at any size, angle and even copes with italics. Four plottable fonts are supplied as standard including three outline fonts.

As you'd expect, there are many other features in CADet giving you the ability to create furniture, architectural designs and even household objects – in fact just about any solid object.

What to do

The first five readers' names and addresses pulled out of the sack after June 30 will receive a FREE copy of CADet worth £149.

Just write to: Micro User Freebies Offer (June), The Micro User, Europress Publications, Adlington Park, Macclesfield SK10 4NP.

Postscript knowhow

BUREAUX with the ability to process PostScript files have been the lifeblood of small publications and even some professional magazines who haven't the money or expertise to use an in-house Linotron system. Now a new company called Arch Images (0733 315424) has been launched to offer the full range of bureau services to everyone.

Until now there has been a lack of a PostScript-based bureau specifically for the Archimedes. The Arch-Images PostScript Bureau is the first to team the Archimedes with a Linotronic Imagesetter.

An 8Mb A540 computer eliminates the time-consuming archive/dearchive and conversion to MSdos disc cycle. This gives speed comparable to the most powerful PC or Macintosh-based systems.

In addition they have 24-bit colour and 256 greyscale scanning and two-page Viking monochrome display which is a front-end equal to almost any task. A 44Mb Syquest format removable cartridge drive gives the ability to exchange long documents and huge scanned images with other machines and facilitates backups.

Finally a CD Rom drive gives access via the PC Emulator to images suitable for inclusion in documents.

An on-site design capability uses Impression II so that last-minute corrections can be made easily. Future plans include high-speed networking of the Acorn computers on-site with Apple Macintosh systems. This will help act as a gateway into the world of professional colour reproduction when 24-bit systems for Acorn computers become widely available.

Initial charges for A4 Bromide and film are £5 and £6 respectively. An Arch-Images Quick Reference card is available free of charge and is designed to fit into the Impression ring-binder.

This memory jogger combines several useful features on to a single double-sided page with a job cost calculator and a list of dos and don'ts, as well as a handy 24-bit drawfile colour reference card.

Queen's award to Acorn

ACORN Computers have won the Queen's Award for Technological Achievement for the second time in their history. The 1992 award is for the development of the Arm 32-bit Risc microprocessor.

The awarding committee have taken into account the fact that Acorn were working at the very forefront of the industry in developing a Risc-based microprocessor at a time when Risc technology was confined to academia.

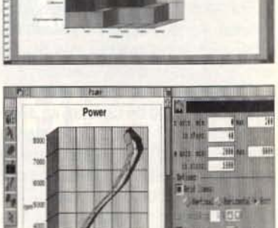
Acorn's MD Sam Wauchope commented: "Eight years ago Acorn received their first Queen's Award for Technological Achievement for the design of the BBC Microcomputer. Just as that design was remarkable in its day, the development of the Arm processor represents a major step forward in computer technology and all of us are immensely proud of this achievement."

Getting to the point

PINPOINT has been upgraded to version 1.16 and all registered users will automatically receive a copy of the new discs from Longman Logotron (0223 425558).

Quite a few enhancements are in this new version, but of most note are the grid option to page editor, the ability to show print borders for page editors as well as showing the rulers option. You can now print the current sheet while entering information and print all current sheets as complete forms from the table view.

Horizontal bar and line charts have been added as has the ability to edit graphs to allow dynamic swapping of axes for bar and line charts.


Opinion Poll: Female Votes Against Total Votes
Opinion Poll: Male Votes Against Total Votes

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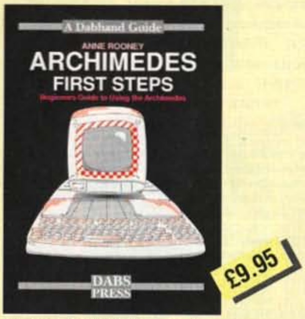
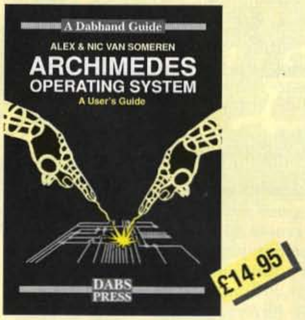
NEW
A Dabhand Guide
BUDGET DTP
ON THE ACORN ARCHIMEDES
ROGER AMOS
DABS PRESS
£12.95

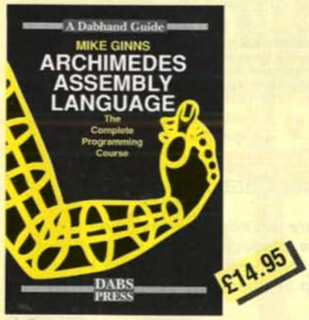
An invaluable guide to the free software on your Archimedes, and how to get the best desktop publishing results for very little cost.



Introductory book for the Arc, covering the basic operations and use of !Edit, !Draw, etc.



Useful summary of OS information with detailed examples. (£21.95) with disc.



The only tutorial and reference on ARM assembler on the market, with many RISC OS examples. (£21.95 with disc.)

BBC SOFTWARE

Hyperdriver

The ultimate printer driver ROM, with over 80 commands, a built-in NLQ character set, WYSIWIG previewing, access from View, Wordwise, Interword or BASIC. 100 page manual. For B/B+/E/M/C. Price £29.95 ROM, £24.95 disc for SRAM.

Minidriver

As HyperDriver but for Mini Office II. Includes Viewdata terminal. £24.95 ROM. SRAM version £19.95.

Mos Plus

Utility ROM for Master 128s only fixing EDIT and CLOSE#0 bugs, ADFS format, verify and backup in ROM, backup/compacting in SRAM, alarm clock and configurable startup facility and much more. Price £12.95 ROM, £7.95 SRAM.

Sidewriter

Pop-up notepad for SRAM users (any SRAM machine), works with any software. Price £7.95.

Assembler Bundle

Two Bruce Smith books on 6502 assembler with discs and Master Series update booklet. For B/B+/E/M/C/ RRP over £30, yours for £4.95!

Fingerprint

SRAM or main memory 6502 machine code monitor/disassembler/memory editor. For B/B+/E/M/C/ Price £9.95.

Conversion Kit

Ready-made 6502 assembler routines, for learning or development. Price £7.95

BBC BOOKS

View Dabhand Guide

Bruce Smith's comprehensive guide to View wordprocessor. 'For those who want a complete thorough and readable guide to View, then Bruce Smith is your man" (Beebug). £12.95 or £17.95 with disc.

Master Operating System

David Atherton's definitive reference work including the famous 'differences between all eight-bit models' section used by countless programmers to ensure compatibility across the full eight-bit range. £12.95 or £17.95 with disc.

Mini Office II Guide

Detailed tutorial by Bruce Smith and Robin Burton for the BBC/Master versions of the software. Price £9.95 or £14.95 with disc.

Mastering Interpreters and Compilers

Fascinating Bruce Smith title on creating high level languages. £14.95 with free disc.

MASTER 512

Master 512 User Guide

Full instruction for using the 512 and DOS Plus, with tips on software compatibility. £9.95 or £14.95 with disc.

Master 512 Technical Guide

The companion guide with full 512 programming information and hardware expansion projects. Price £14.95 or £19.95 with disc.

Master 512 Shareware Collections

Two collections of PC shareware, all tried and tested on the 512. Includes WP's, spreadsheets, databases, games etc. Five full 800k discs in each. Each collection normally £29.95, special offer £25 for both.

ARCHIMEDES SOFTWARE

Instigator

Utility system providing disc sector editor, memory editor, disassembler, command line archiving, and much more. Price £49.95

Arc PC Emulator Shareware

Similar to Master 512 Shareware but for the Arc PC Emulator. Two collections of five discs each. Normal Price £34.95. Now on special offer, both collections for £25.

ARCDFS

Very popular program to provide full DFS facilities on desktop or !65Host/!65Tube. Price £29.95

ARCHIMEDES/BBC BOOKS

Basic V Guide

BASIC V guide covering differences between earlier BBC BASICs and the superior version for the Archimedes. £9.95

C: A Dabhand Guide

Massive 512-page complete guide to C programming. No previous experience required. Arc & BBC sections £14.95 or £21.95 with disc.

OTHER BOOKS

Z88: A Dabhand Guide

Introduction to the Z88, by the designers of the machines own software. £14.95

Z88 Pipedream Guide

John Allen's detailed work on all aspects of Z88 PipeDream. Good explanations of printing. Price £14.95

Psion LZ OPL Guide

Ian Sinclair's guide to OPL programming on the LZ series of Organiser machines. £12.95

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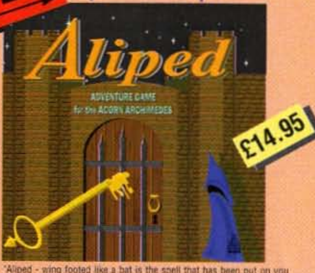
NEW *Games Action*



'Aliped - wing footed like a bat is the spell that has been put on you by the evil step-mother of your fair princess Natasha'.
Smooth multi-directional scrolling castle, stunning use of stereo sound, high quality graphics. Needs 1MB. RISC OS compatible.

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A SPACE ADVENTURE
on the Acorn Archimedes
£14.95

The date is 2143 A.D., the universe has started to contract, causing the most inner galaxies' fine balance to be upset. Their only chance is you in your humble rescue ship.
Multi level game with high quality graphics. Needs 1MB. RISC OS compatible.

STARCH
Archimedes Action Game
£14.95

'Harry and Dave manage the laundry firm, but things have been going wrong. They work all night but will they put things right?'
Multi level game, high quality graphics, simple key controls for easy movement of characters. Needs 1MB. RISC OS compatible.

MORE ARC GAMES

ALERION
Classic shoot-em-up scroller. Multi-level, RISC OS compatible. Not protected. £14.95

ARCENDIUM
Draughts, Backgammon, Reversi and Quadline, now RISC OS compatible. £14.95

ALIEN INVASION
Classic Space Invaders with editable invaders, waves etc. £14.95

ALL-IN BOXING
Realistic boxing game with digitised sound etc. 1 or 2 player. £14.95

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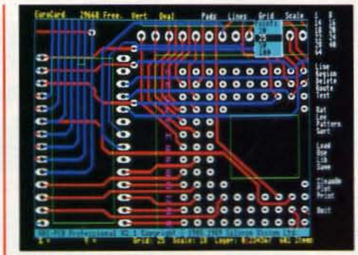
The first fully integrated environment for 3D CAD, Photo-realistic rendering, Interactive animation, Texture mapping, Programmable animation and high resolution hardcopy to printers and plotters taking designers to new heights of design productivity and performance exceeding the capabilities of 'heavy-weight' packages on PC-compatibles and workstations which cost considerably more. The software provides 3D CAD facilities for Architectural, Engineering and Interior design offering a turnkey solution satisfying all your conceptual design and presentation requirements.

"Puts Silicon Vision at the top of the CAD market"
- A&B Computing November 1990.

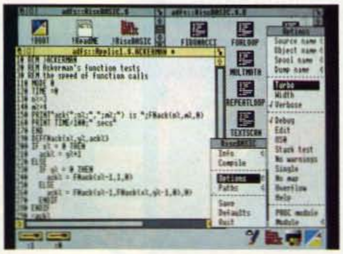
ARC-PCB Schematics



The ultimate Electronic design package providing both circuit drawing and pcb layout in one design interface for a fully integrated system that surpasses all other PCB design systems in features & speed of operation for the fastest turnaround from concept to finished board design.
Features include Component schematics, Free-form circuit drawing, Automatic routing, Rats-nesting, Multiple-layers, Oval, Circular & Surface mount Pads, Component Pulling, On-line Help, Digital & Analogue tracks and up to 300,000 components. Take the lead for your PCB designs before your competitors do.

"Performs up to professional standards. Most comprehensive available on any micro"
- BBC Acorn User February 1989.

RiscBASIC



The best BASIC V compiler money can buy. *Features include an optimising compiler, relocatable modules with multiple star commands, Window-based or command line compilation environment, standalone code generation, in-line assembler with powerful floating point mnemonic extensions and a Desktop developers environment from a leading Software House renowned for technical excellence.*

"If you are looking for THE compiler to go for, and are confused about which one deserves to win the very public battle that has been raging in the advertisements, well my preference is for RiscBASIC"
- RISC USER August 1989.

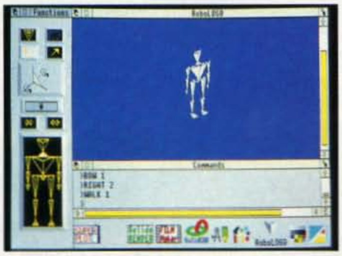
"very useful indeed for development work...produced significantly more efficient code" - ***Micro User July 1989.***

SolidsRENDER

The most advanced Ray Tracing package for the Archimedes producing photo-realistic images of designs taking into account multiple colour light sources, reflections, shadows, transparencies, refractions and textures for the highest quality pictures from the leading 3D graphics experts renowned for technical excellence. The high-speed ray tracer provides anti-aliasing for smooth edges, motion blur effects, and variable camera lens for wide angle and telephoto effects.

"SolidsRENDER offers the most comprehensive and advanced object properties ... the fastest ray-tracer ... outputting the highest quality images"
- A&B Computing November 1990.

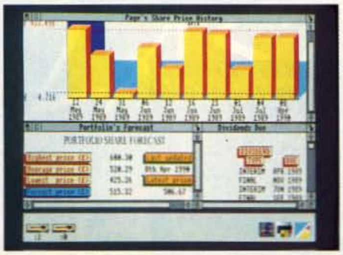
RoboLOGO



This new extension to traditional LOGO, provides three dimensional control of an articulated humanoid or animal figure based on the standard LOGO language. Natural commands such as 'Walking', 'Turning', 'Bowing', and 'Picking', etc are automatically represented graphically by natural movements of the 3D figure which is readily understood by students using LOGO as an introduction to computing. The traditional Turtlegraphics & 3D Glider features are also supported for students to further explore their school work.

"Takes turtlegraphics and LOGO programming into a new dimension. The things that the robot can do are only limited by imagination!" - Educational Computing April 1991.

ShareHolder



The complete share holder's management system providing all the facilities needed to automate your portfolio. Features include Company statistics, Share holdings, Transaction processing, Portfolio history, Forecasts, Dividends due, Share price updates plus built-in Calendar, Calculator and Hardcopy facilities for total integration.

"An excellent concept, the first professional share related package for the archimedes ... well thought through ... remarkably comprehensive."
- Archimedes World March 1991.

All RISC OS software run in native mode on all Archimedes Computers & BBC A3000 with 1 Mbytes.

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Product Catalogue

For more details on these and other software products in our range please enquire for a free copy of Silicon Vision's 'Desktop Solutions' product catalogue.

THE CD-Rom revolution is here, but there's a lot to know if you want to get the most out of it. So in this article we'll be looking at many different aspects of the subject.

For the Acorn machines all CD-Rom drives must have SCSI interfaces, likethe Apple Mac. Don't be fooled intobuying the apparently cheaper PC CD Rom drives, which have much simpler interfaces and plug in direct.

There are important differences between music CD players and CD-Rom drives, the most important being quality. For music it's not so important if a single bit of information is read off the disc incorrectly, in the mass of sound information an error will not be noticed.

But for digital information such an error could produce disastrous results, so high precision is essential and hence the price is higher too. However, there is no reason why a CD-Rom drive can't play music CDs and, given the right software, they do.

A surprising difference between music CD players and CD-Rom drives is the *caddy*. All music centres have motorised caddies that emerge at the touch of a button – on goes the CD which is then taken into the heart of the machine for playing.

On all the CD-Rom drives we looked at, the caddy was a separate unit that had to be inserted manually. This is probably a price consideration but makes the CD-Rom drives almost primitive.

As these units connect to the SCSI bus they have to be switched to a unique drive number, from 1 to 7. Only the Hitachi had easily accessible switches for this purpose.

Another aspect for the future is the Photo CD from Kodak. You take normal photographs with a standard camera and take the film down to your local processor who scans the images on to a CD. This can then be taken home and replayed on an audio/photo CD player or special home multimedia player.

Or the information can be read with a CD-Rom drive and loaded direct into a micro where it can be processed. In the commercial world this will revolutionise low to medium desktop publishing but its impact on the home market will be less intense as you can't show the pictures to friends you meet on the street.

It has a lot of potential for education and multimedia projects.

Compact decisions

Steve Turnbull, Mike Cook and Steve Bruntlett assess the impact of CD technology in Acorn's 32-bit universe

The CD-Rom drives

Product: CAA 432, CAA 532
Price: £577 (incl SCSI interface and cable)
Supplier: Cumana (0483 503121)

Of the two CD-Rom drives supplied by Cumana the CAA 432 is currently available and the CAA 532 is the latest machine but is only available to schools through the Acorn A5000 CD-Rom offer.

The two units are styled differently: The earlier version is about 2in high, 10in wide and 11in deep while the new one is 3.5in by 7in by 11in which makes it more like an old BBC Micro double disc drive. Both are finished in grey with the red Cumana label on the front although the older one is plastic and the new one metal.

The older machine has a standard plug-in power lead, two SCSI sockets and stereo output sockets. The only difference with the newer one is that the power lead is integral. The power switch is on the back in both machines.

On the front of both, apart from the caddy slot, is the eject button, mini jack socket for stereo audio output, volume control, power light and drive access light.

The CD caddy is a single unit with a lid – open it up, stick in the CD, close it and push it gently into the machine, and it gets grabbed – like a video – and loaded. Pressing eject brings it up to a position where it can be extracted. Only one caddy is supplied with the machine.

Because it's designed for the Acorn machines there's control software to allow music CDs to be played. None of the other machines has the Risc OS applications to allow this.

Product: CDR-1750S
Price: £515
Supplier: Hitachi (081 849 2000)

The Hitachi unit arrived without any form a SCSI connector or software for any machine – just the drive and the power lead – so you would need a SCSI lead at the very least to get yourself up and running.

It measures 2.5in high by 9in wide by 12.5in deep – quite a bit longer than any of the others. The finish is beige which matches the casing of the Acorn machines very well. Each side of the front panel tapers inwards giving the unit an unusual appearance.

Unique to this machine is a cover that protects the caddy slot from alien invasion while the caddy itself is the same as the Cumana unit. The power switch is mounted on the front and is a big orange button that rather spoils the design.

There are three lights: Power, busy and disc, the last one indicating whether a disc is currently in the machine. There's also a mini stereo headphone socket and volume control.

Product: CM 231
Price: £550
Supplier: Phillips (0306 875777)

This is quite an old system and came with Apple Mac software. However, it plugged into the SCSI board without any problems and worked perfectly.

It's coloured light grey to match the Apple Mac and is the biggest of all the units, measuring 3in high by 12.5in wide and 11in deep and is constructed from metal.

The controls on the front include the power switch, power light, drive light, audio volume control and a normal-sized jack socket, which will be useless to most people. There's no eject button.

Of all the drives we looked at the Phillips had the worst caddy system, involving a kind of gripper – from which a CD can easily fall – which is inserted into a case and the whole thing is then pushed into the drive. It clicks into place and the outer case is then removed leaving the CD inside with the gripper.

This caused an unbelievable panic at first as the instructions are not clear and this wasn't expected. To extract the CD-Rom you have to insert the outer case again click it in place and pull it out – miraculously the CD and gripper come with it.

Using the SCSI podules

Product: Rapido SCSI Interface
Price: £199
Supplier: Lindis, Linstead Magna, Halesworth, Suffolk P19 ODU
Tel: 098 685 477
Product: Morley 300 / 400 / 5000 Standard SCSI podule
Price: £149
Product: Morley A3000 Standard SCSI podule
Price: £169
Supplier: Morley Electronics, Morley House, West Chirton, North Shields, Tyne and Wear NE 29 7TY.

TO connect a CD-Rom drive to the computer you need an SCSI interface. This is a standard interface that can be used to connect many different devices to the computer from mass storage to flat bed scanners. However, what you need is not only the SCSI interface card but also some software to talk to the device you want to connect up.

We tested the Morley SCSI interface with an aging A310 and a Lindis one inside an A5000, the CDFS – CD-Rom filing system – from Acorn comes as standard on both. It is likely that other SCSI interface manufacturers will also provide the CDFS but you should check first if this is what you want.

The driving software can cope with a computer that has not had the MEMC1a upgrade and makes the appropriate alterations. Without the new chip, data transfer is slower but the system is so fast that this wasn't a problem. Fitting is not difficult either, the board slots in the podule backplane, though the instructions for the Morley board said it had to be in the top-most slot.

Most SCSI watchers seem to be obsessed by speed – it's one parameter that can distinguish between different cards.

However, it doesn't really matter for most purposes whether it takes half a second or even a quarter of a second to load in a file, as in most cases it's the drive that's the limiting factor.

Nevertheless for a quick test, a 2Mb file was copied from a CD-Rom to a hard disc on the old 300 series: It took about 20 seconds which was pretty creditable considering the lack of MEMC1a. The same exercise took 35 seconds on an Apple Mac.

Accessing the PC and Macintosh CD-Rom world

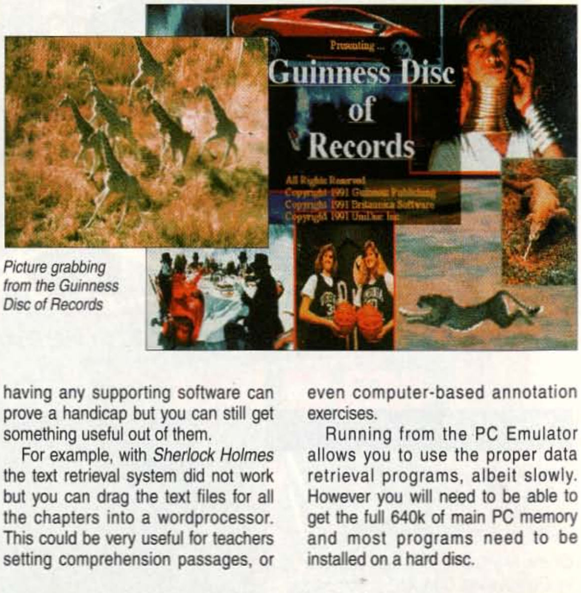
There are three different formats for CD-Roms: IS09660, High Sierra and Apple standard – the CDFS can only cope with the first two. This is a pity because there are many Mac CD-Roms containing clip art, sound samples and text. However some Mac CD-Roms are in a non-Apple format.

If you are accessing a non-Archimedes CD-Rom from the native Acorn machine – not using a PC emulator or board – the best thing to do is drag various files into appropriate applications to see what's there.

For example text files can be dragged into !Edit while PCX picture files can be loaded into !Translatr. An Acorn-based Unzip program would be useful for Zip-compressed files and some CDs have their own custom-designed compression methods. Not having any supporting software can prove a handicap but you can still get something useful out of them.

For example, with *Sherlock Holmes* the text retrieval system did not work but you can drag the text files for all the chapters into a wordprocessor. This could be very useful for teachers setting comprehension passages, or even computer-based annotation exercises.

Running from the PC Emulator allows you to use the proper data retrieval programs, albeit slowly. However you will need to be able to get the full 640k of main PC memory and most programs need to be installed on a hard disc.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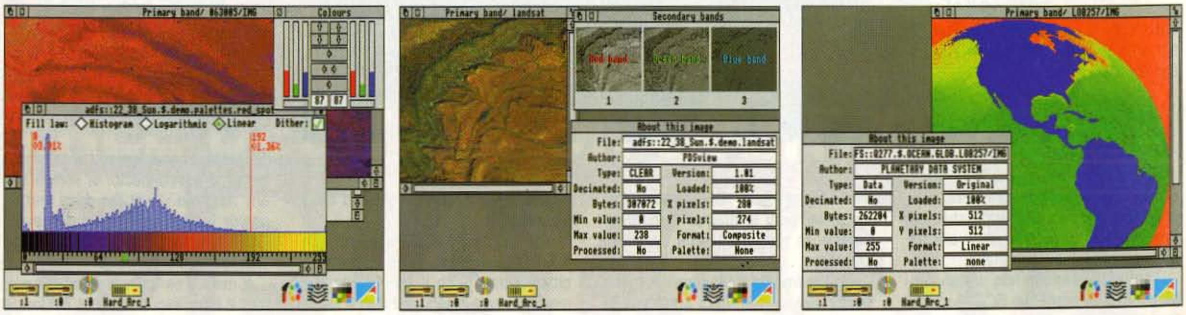
Picture grabbing from the Guinness Disc of Records



About this image
File: adfs::22_38_Sun.$.demo.landsat
Author: PDSview
Type: CLEAR
Version: 1.01
Decimated: No
Loaded: 100%
Bytes: 307072
X pixels: 280
Min value: 0
Y pixels: 274
Max value: 238
Format: Composite
Processed: No
Palette: None

About this image
File: FS::0277.$.OCEAN.GLOB.L08257/IMG
Author: PLANETARY DATA SYSTEM
Type: Data
Version: Original
Decimated: No
Loaded: 100%
Bytes: 262204
X pixels: 512
Min value: 0
Y pixels: 512
Max value: 255
Format: Linear
Processed: No
Palette: none

Images from space – what you can get with PDSview

CD Rom software

Of the CD-Roms with a Risc OS front end only Revelation 2 is readily available. The others have the original PC software on the disc but a separate ADFS disc is supplied with the Risc OS front end.

This system of conversion from PC to Acorn is very effective and provides a potentially fast turnaround as only the front end needs to be written, the actual CD-Rom data already exists.

Product: Revelation 2
Price: £139
Supplier: Longman Logotron (0223 425558)

This is the only completely native Risc OS CD-Rom we were able to find and consists of the Revelation 2 software, Revelation Xtra, some Magpie-based demonstrations and about 63Mb of resource pictures divided up into diverse areas such as insects and transport.

The software has not been altered in any way it's just a convenient method of supplying the whole thing in one go. Educational establishments should find the picture resources very useful across the curriculum.

Product: PDSview
Price: £99.50
Supplier: Spacetech (0305 822753)
Requirements: Minimum 2Mb better with 4Mb plus optional CD-Rom

PDS stands for Planetary Data System and it is the name used to release a staggering wealth of information from NASA on compact disc. However, PDSview is not just dedicated to NASA's images but is a powerful general-purpose image processing package.

You really need at least 2Mb of memory and preferably 4Mb to run this program. In addition you get much better results with a multi-sync monitor running in Mode 28. This has special features to make reading the images from the NASA roms easy, but it can be used with all kinds of images acquired by many different means.

PDSview offers a wide range of image processing options although some are presented in rather a novel way when compared to other image processing packages. For example, a staple of such a package is its histogram operations. These effectively control the contrast and brightness. However, due to the lack of a full palette on the Archimedes, these have to be implemented by altering the image data. This means that these operations are not reversible and you have to reload the image to have another try.

PDSview also offers several different cursor options. When moved over the image you can display the x,y coordinates, pixel frequency or pixel value. The cursor can be set to draw a line across the image and then the density profile across the line is shown in another window.

Alternatively, the cursor can define an area and the histogram of the area is shown in another window. When the cursor is set to display pixel values these can be calibrated as a direct readout of temperature on some of the thermal images.

An area of image processing that is most important are the window operations. These involve applying a small rectangular matrix over the whole image. Depending on the numbers in the matrix you can sharpen, soften, enhance edges or implement other operations that change the image.

These can be applied to a small section using the preview window before you commit it to the whole image. You can also alter the numbers in the matrix to create any type of window operation. One powerful feature is the ability to handle multi-band images. A multi-band image is really two or more images of the same target taken through different filters. PDSview allows you to combine these to give a colour image. It applies an error diffusion algorithm to compensate for only having 256 colours.

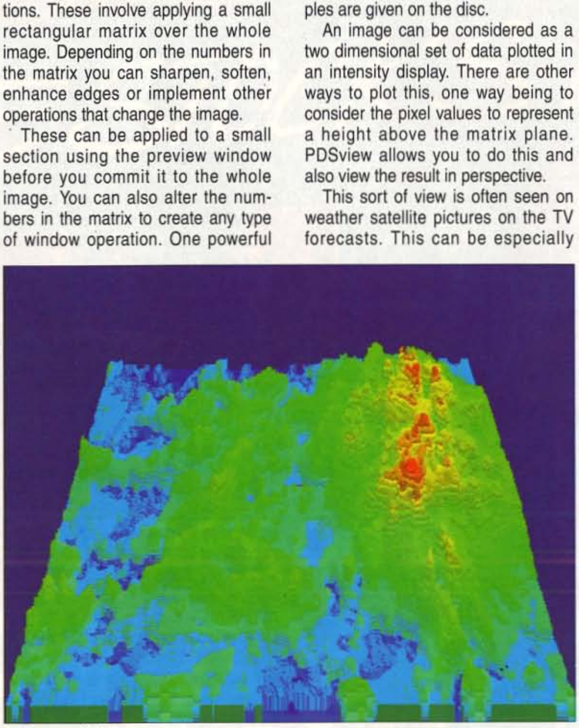
Picture gallery – more grabbed screens from the Guinness Disc of Records

Often multi-band images are taken at different times so the pixels in one band do not correspond with the pixels in others. If this is so the image needs to be subjected to geometrical operations – movement in horizontal and vertical directions as well as scaling in the X and Y direction. The final form of geometric operation is that of rotation, which is included but is only available to users with Risc OS 3.

While a multi-band image allows you to create false colour images a single band can still be coloured using pseudo colours. Here, different pixel values are represented by different colours. PDSview allows you to define a pseudo-colour palette and save the definitions. Several examples are given on the disc.

An image can be considered as a two dimensional set of data plotted in an intensity display. There are other ways to plot this, one way being to consider the pixel values to represent a height above the matrix plane. PDSview allows you to do this and also view the result in perspective.

This sort of view is often seen on weather satellite pictures on the TV forecasts. This can be especially effective, not only on cloud images where the brightness of the cloud is proportional to its height, but also on certain radar images especially of the surface of Venus.



A 3D map of Venus

It's often very tiresome to keep applying the same set of processes to many images so a command script feature is very useful. Here you can prepare a script with a text editor or log your menu selections as you make them. These can then be played back and applied to many different images. This is especially important when you use the PDSmovie application.

PDSmovie is a separate application allowing you to string many images together to produce a movie sequence. It could be the swirling of gas around Jupiter's great red spot as seen by Voyager or the rotation of the Earth taken from an oceanographic survey satellite.

Unless the window is small the animation is not particularly fast. Each frame is visibly drawn up the screen for a half screen size window. With an

Arm 3 processor no doubt this would be faster. When I tried it, the movie files took a large amount of room: 1Mb for just three frames from Jupiter. This option will really require a hard disc to show it at its best as full screen sprites do take up a lot of room.

All in all, a very comprehensive image processing package. As the manual says an image processor is rather like a wordprocessor – the results depend on you and your understanding. New users should be able to extract quite a lot from the NASA CD-Roms but experienced image processors will have to adjust their thinking a little to come round to Spacetech's way of looking at operations.

Product: Space Science Sampler
Price: £40
Suppliers: Spacetech (0305 822753)

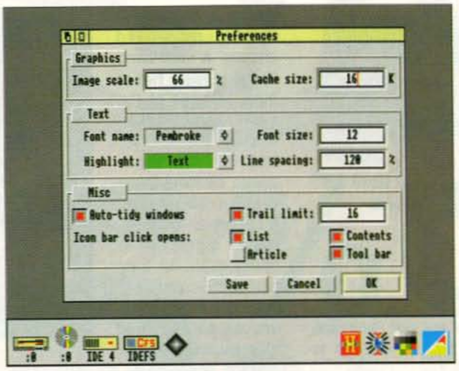
Coming in two volumes, the first is full of Voyager images from the Uranus encounter in 1986. The disc contains 800 of the best including all the images of the rings and its satellites. Each file contains a readable Ascii header followed by the image data. The files are organised into folders corresponding to targets such as Ariel, Miranda, Uranus and U-Rings.

Volume 2 contains a cornucopia of images from other missions. These files were collected during the Interactive Data Interchange workshop which has produced a rich variety of different types of data and file format.

Here the files are organised under five headings: Astronomy, Land science, Ocean science, Planetary science and Solar-terrestrial physics. The planetary section includes small selections from the two Voyager craft as well as Mars and Earth surveillance images.

In addition the disc contains non-image data like visible and infra-red star catalogues as well as space plasma and lunar seismological data.

Unless you have some viewing software like PDSview, this set will only be of interest to programmers. If you can program, there are projects a-plenty to be derived from this magnificent set. You can plot what the night sky would look like if we had vision in the middle infra-red – it's very different indeed.

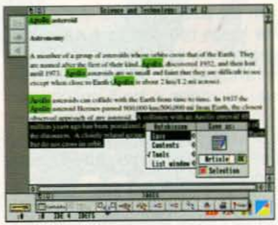


Graphics
Image scale: 66 %
Cache size: 16 K

Text
Font name: Pembroke
Font size: 12
Highlight: Text
Line spacing: 120 %

Misc
☒ Auto-tidy windows
☒ Trail limit: 16
Icon bar click opens: ☒ List ☐ Article ☒ Contents ☒ Tool bar

Setting up the Hutchinson's Encyclopedia for the way you like it



Text can be taken straight out of an article

Product: Voyagers to the Outer Planets
Price: £200
Supplier: Spacetech (0305 822753)

Contains all the images from Voyagers 2's encounter with Uranus and Neptune as well as the best images from both Voyagers 1 and 2 for the Jupiter and Saturn missions.

All images are unprocessed, complete with the duds where the cameras were pointing at nothing and those that look like a motorbike was passing during down loading.

There is a so much data here that not all of it has been looked at in detail. Only a few months ago three strange round features were discovered on Triton – the largest of Neptune's moons – using special image processing techniques. These are thought to be the remnants of volcanic craters frozen just below the surface in ice.

Each image appears twice in the set, once as a low resolution browser image of 200 x 200 pixels and once as the full resolution 800 x 800 image. The browser images are not compressed and so can be used as a quick and simple taster and being smaller they do not require as much disc space.

The full resolution images are compressed using Huffman encoding so a 625k image is squeezed into a 220k space. The penalty you pay is that decoding takes time, about 35 seconds using PDSview.

Along with each image, stored in the same file, is a histogram, a graph of the distribution of grey levels within an image as well as engineering information. This tells you about the target, the time the image was taken, and when it was received back on earth. In addition there is the exposure time, shutter mode, filter colour and a comment about the purpose of the image.

This is all very interesting and can be used to enhance your understanding of what you are seeing. For example some images appear mainly blank with a few background stars. The comments tell us they are searches for previously unknown satellites. A satellite will show up as a streak as it will be moving relative to the background stars. Who knows how many satellites are lurking undiscovered on these images, especially the unpromising looking ones? PDSview allows you to just look at these labels without loading in the images.

The Voyager spacecraft images are monochrome with a possible 256 shades of grey. The multicoloured images in books and on the TV have been pieced together from several images taken through different coloured filters.

Product: The Guide Star Catalogue
Price: $54.95 (US dollars), VISA & Master Card
Supplier: Astronomical Society of the Pacific, 390 Ashton Avenue, San Francisco, CA 94112, USA

Before the Hubble telescope had even left the ground it had already instigated a huge achievement: The production of the Guide Star Catalogue available on two CD-Roms containing 18,819,291 objects in the range 7th to 16th magnitude. About 15 million are stars and most of the remaining are galaxies.

Sky survey plates have been digitised and analysed to produce the catalogue. It was designed to assist scientists operating the telescope to choose a suitably located star to lock on to while the telescope makes its measurements. But it can also be used by anyone studying the distribution of stars or making detailed star finder charts.

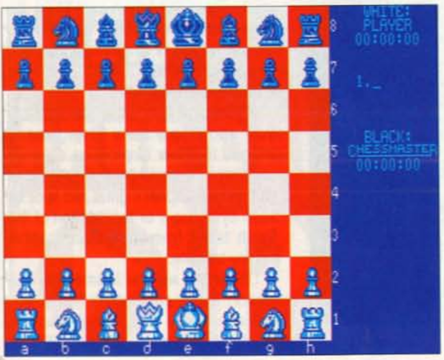
Product: Hutchinson Electronic Encyclopaedia
Price: £99 (£29.95 for Risc OS upgrade to PC version)
Supplier: Attica Cybernetics (0865 791346)

This reference work has been converted from the PC by PEP Associates and is a superb encyclopaedia for everyone. When you load this it looks like any other Risc OS application but the quantity of information is quite staggering and shows perhaps more than anything else the amount of data a CD-Rom can hold.

The manual gives you a tour of the package and as you would expect with any database you can browse, search, cross-reference, backtrack and much more.

The main menu has a selection of subjects and in a window on the right there's an alphabetic list of headings under the selected subject. You can also swap from headings to a word list which shows every significant word that appears in the articles in the selected subject.

To look up a subject you can just double-click its heading in the win-



Chessmaster 2000 from the Games Pack

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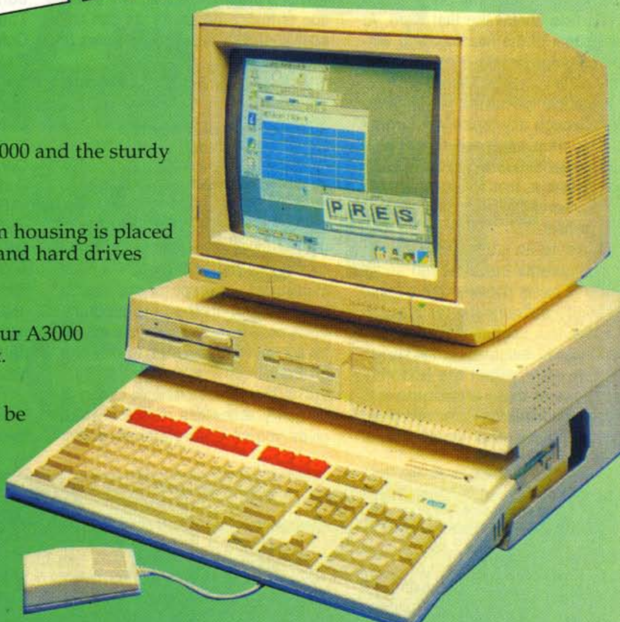

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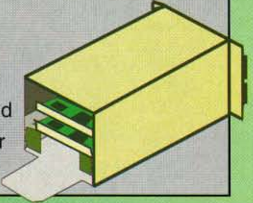

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dow, or if you have the word list double-clicking a word will bring up the first article containing that word. At the bottom of the heading/word window is a type-in area from which you can perform a simple search.

An article trail allows you to backtrack through any topics you looked-up. For more advanced searching a very powerful system allows you to look up articles that, for example, contain the words Bacon or Shakespeare and not ham.

There is an audio tour of the Encyclopaedia but although some similarity exists between the original PC control software and the Risc OS one, the tour soon makes too many references to features that don't exist.

Each entry within the text may boast one of three extra icons in a toolbox. If these icons are highlighted you can access either an extra table, some audio output (music for example) or a picture. The text, or a selection of it, can be saved, as can any additional data including the tables or picture.

All in all this is a very nice package.

Product: Software Toolworks
Reference Library
Price: £117.44
Supplier: Mindscape (0444 246333)

To use this CD-Rom you will need to use the PC Emulator but of all the PC CDs we looked at this was the most successful – except for the search facility which crashed the program. This seems to be a fault of the emulator not the software which worked fine on a *real* PC.

The Toolworks Reference Library is an easily accessible resource which gives you several reference works: Webster's New World Dictionary (3rd edition), Webster's New World Thesaurus, Dictionary of Quotable Definitions, New York Public Library Desk Reference, Dictionary of 20th Century History, Guide to Concise Writing, Spelling Checker, National Directory of Address and Telephone numbers and J. K. Lasser's Legal and Corporation Forms for the Smaller Business.

Of these the last two are the least useful as they relate specifically to the US, while the History and Desk Reference are very US-oriented. The Webster's references are very good and do provide UK spellings as alternatives. The book of quotes is wonderful to browse through even if the search option doesn't work.

The Desk Reference is a curious beast having information on proper forms of addressing in letters and a complete section on court etiquette. It also gives conversion factors for all manner of weights and measures plus statistics on the geographical make-up of major towns in the US – oh well.

Even so, running this software on the multi-tasking version of the Emulator turned it into a very useful work indeed.

Product: CD Games Pack
Price: £99.99
Supplier: Tecnoplus (0604 768711)

This is another PC-only selection consisting of Chessmaster 2000, Cribbage King, Gin King, a 3D game called Black Hole and Bruce Lee lives.

Of these fairly old games only Chessmaster 2000 and Black Hole worked on the PC Emulator – slowly.

CD-Rom experiments in education

NCET are currently funding initial teacher training institutions for small scale research projects focussing on the use of CD-Roms in education. And it's already funding the CD-Rom in Schools project which has been running now for nearly a year but most CD-Roms seem to have been placed in libraries and are running primarily on PCs.

At de Montfort University, Leicester – formerly Leicester Polytechnic – two short-term research projects in local schools are being run. The first is concentrating on the practical use of CD-Roms as a program and resource carrier in an IT context using the CD-Rom version of Revelation 2.

The second will focus on the use of CD-Rom as a resource base in combination with digitisers and scanners for the investigation and production of imagery using digital photography and electronic collage.

These projects will be carried out by PGCE (Art and Design) student-teachers in collaboration with supervising teachers and tutors during the summer term culminating in an exhibition and a report for NCET and local schools.

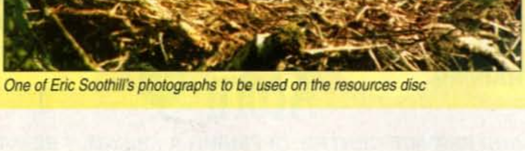
Cheap enough to spread

While the use of CD-Rom technology is still at an early stage it is becoming cheap enough to put into specific departments such as Art and Design. Many PC-based CD-Roms can be used via the PC Emulator or more easily with the new VGA Emulator or 386PC card – when the CD-Rom driver is available – but an increasing number of CD-Rom applications are being converted and developed specifically for the Acorn machines.

At this early stage of the project there seem to be a number of ways in which CD-Roms can be used to extend the work done with computer systems in art and design. There also seem to be several different types of CD-Rom which it should be possible to develop for use in schools.

One aspect of art and design work in schools is the use of visual resources, whether from books, magazines, slides or video tape in the production of paintings, drawings and designs. These kinds of resources are often expensive to set up and time consuming to maintain.

CD-Roms promise a large supply of visual resource material which can be used for research into all manner of design work. This currently includes material on the Revelation 2, RSPB Birds and LandSat space photograph discs used as clip art for DTP and poster work. More interestingly is the use of the scientific photographs on the Revelation 2 CD-Rom application in the production of original work.



One of Eric Soothill's photographs to be used on the resources disc

Need for art resources

What Archimedes CD-Roms don't offer yet are collections of photographic or art and design work. There is a desperate need for this kind of art and design resource material if schools are to develop the kind of computer-based Critical Studies projects that seem possible using investigative and hypermedia-based software such as Pinpoint, Genesis II and Magpie.

The introduction of the Attainment targets Investigation and Understanding in the proposals for National Curriculum Art will create problems for schools in resourcing the work done by pupils in these areas. CD-Roms seem to be a natural vehicle for delivering much of the art-based resource material required for this kind of work. It's now up to the educators, galleries, museums and the CD-Rom application producers to provide this type of material.

Special Needs is another area where CD-Roms will have a great effect. NCET have recognised this with the sponsorship of the Special Needs Resources Disc from Cumana and NorthWest Semerc. Due for release in 1993 it aims to include comprehensive curriculum support material. Pictures and aural data will be based around the National Curriculum with access systems for various degrees of learning difficulties and/or physical or sensory impairment.

In particular early language work is supported with pictures on the perennial themes of transport, farms, home, space, food and science. Teachers are given aids with illustrations to use on maths worksheets, continental-style cartoons for modern language work and drawings of children and adults at work and play with illustrations from classic children's stories.

High resolution photographs are incorporated with authentic bird song supplied by naturalist, Eric Soothill. To inspire story writing, sound effects of screams, storms and church bells are to be included as well as talking flash cards for early readers and social sight vocabulary. All this will give overall coverage of Key stages 1, 2, 3 and special education needs.

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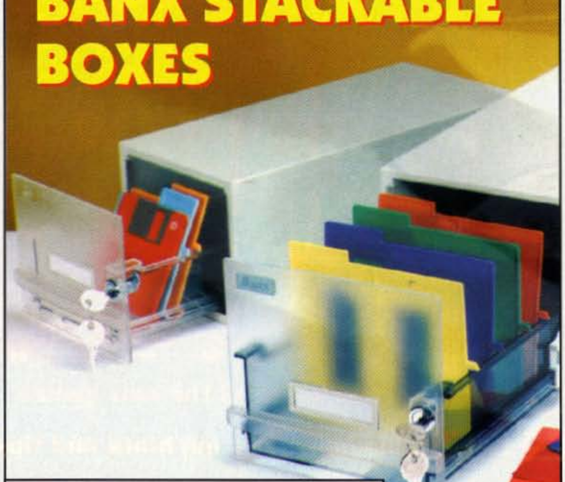

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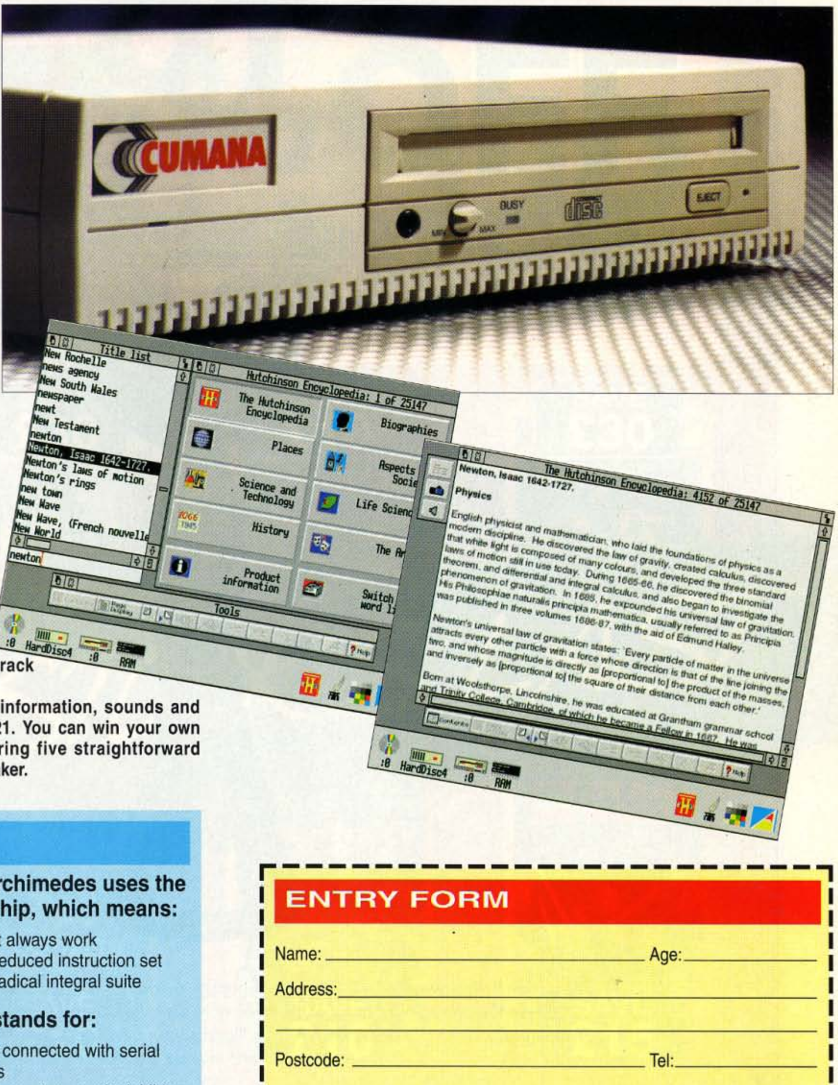
CD Roms give you access to a whole world of information, sounds and pictures as you can see from our article on page 21. You can win your own system – normally retailing for £500 – by answering five straightforward multiple-choice questions and completing the tie-breaker.



New Rochelle
news agency
New South Wales
newspaper
newt
New Testament
newton
Newton, Isaac 1642-1727.
Newton's laws of motion
Newton's rings
new town
New Wave
New Wave, (French nouvelle
New World

newton

The Hutchinson Encyclopedia: 4152 of 25147

Newton, Isaac 1642-1727.

Physics

English physicist and mathematician, who laid the foundations of physics as a modern discipline. He discovered the law of gravity, created calculus, discovered that white light is composed of many colours, and developed the three standard laws of motion still in use today. During 1665-66, he discovered the binomial theorem, and differential and integral calculus, and also began to investigate the phenomenon of gravitation. In 1685, he expounded his universal law of gravitation. His Philosophiae naturalis principia mathematica, usually referred to as Principia was published in three volumes 1686-87, with the aid of Edmund Halley.

Newton's universal law of gravitation states: 'Every particle of matter in the universe attracts every other particle with a force whose direction is that of the line joining the two, and whose magnitude is directly as [proportional to] the product of the masses, and inversely as [proportional to] the square of their distance from each other.'

Born at Woolsthorpe, Lincolnshire, he was educated at Grantham grammar school and Trinity College, Cambridge, of which he became a Fellow in 1667. He was

THE QUESTIONS

Answer these five questions correctly on the entry form provided and you stand a chance of winning this superb piece of hardware. Make sure your entry arrives at *The Micro User* offices before June 30.

1. CD Rom means:

a. Compact Design Read-only memory
b. Compact Disc Read-only memory
c. Compact Data Read optical memory

2. Multimedia is the technique where:

a. Moving images, text and sound are all combined
b. You can add pictures to databases
c. Discs can be used on different computers

3. The Archimedes uses the Risc chip, which means:

a. It doesn't always work
b. It has a reduced instruction set
c. It has a radical integral suite

4. SCSI stands for:

a. Systems connected with serial interfaces
b. School computer security inhibitor
c. Small computer systems interface

5. Multi-tasking is a term which means:

a You can have more than one application running in a computer at once
b Two or more files can be held in memory
c You can run a printer from your computer

ENTRY FORM

Name: ______________________ Age: ________
Address: ______________________________
____
Postcode: ______________________ Tel: ________

Answers

1. ☐ A ☐ B ☐ C
2. ☐ A ☐ B ☐ C
3. ☐ A ☐ B ☐ C
4. ☐ A ☐ B ☐ C
5. ☐ A ☐ B ☐ C

Tiebreaker (no more than 20 words)
CDs are the media of the future because. . .
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____
____
____

Now send this to: Cumana CD Rom Competition, *The Micro User*, Europa House, Adlington Park, Macclesfield SK10 4NP.

THREE REASONS TO CELEBRATE

IMPRESSION II
TER SH

Impression II was awarded the Computer Shopper award for the best non-PC business software. Given the prestigious nature of the other nominees, this award is particularly satisfying. Amongst the other nominees were Adobe Illustrator for the Mac, Claris Works for the Mac and WordPerfect also for the Mac.

○

As of the end 1991 sales of Impression topped 15,000 copies, making this the most successful Archimedes product to date.

○

Impression II now forms part of the Acorn Publishing system, a complete top end DTP solution based on the A540, released by Acorn.

Computer Concepts Ltd

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EDUCATION Update

Prices plummet

CUMANA (0483 503121) have dramatically reduced the education price of their range of SCSI hard drives for the Archimedes.

The price for a 52Mb external drive starts at £299. Drives differ in size to a maximum of 210Mb all offering a track-to-track seek time of 5ms with DisCache and a data transfer rate of 4Mb/sec synchronous.

DisCache is a scheme which provides faster access to data stored on a disc by anticipating the host system's requests for data. The unit is housed in a metal casing, has full auto-parking and fully complements Cumana's other storage devices.

A new era

NEW Era Software (0283 812818) have been increasing their educational product range for the Archimedes. New to the catalogue is a special needs package called Precision, due for imminent release.

This piece of software improves vocabulary and can enhance reading skills. Facilities are provided to help with learning, testing and recording, with colour to distinguish the different stages and a limited number of selected words.

Precision is priced at £20 and if you want to add pictures, this option is available via a disc of 100 illustrations called Pictures that costs £8. The disc contains small topic groups from transport to fruit and vegetables and can be used with a wide variety of other programs.

For the more European-minded take a look at Wortgut, Lexique and Palabra. These are fully defined GCSE dictionaries in German, French and Spanish respectively and cost £25 each.

They can be used with any age and ability level. Each entry has grammatical information and you can add, delete or edit words and information at will.

A simple button changes the master language and all the headings. As these programs are fully multi-tasking you can use them with a host of other Risc OS programs.

Helping hand

THE world of educational software can be very confusing, but Rickitt Educational Media (0460 57152) are offering a way out of the maze. The Educational Software Directory 1992 is available free of charge directly from Rickitt.

The directory consists of 96 pages from over 50 publishers giving information of National Curriculum Key Stages, Attainment Targets and ages. It covers programs on a host of home computers including the Archimedes and BBC Micros with programs ranging from pre-school to adult learning from projects to special needs.

Hyper-entrepreneurs

PUPILS of Class 3 of St George's RC Primary School have formed their own software company called No Frontiers Software.

Using Magpie from Longman Logotron, the 8-10 year olds are producing a disc called the Europe Hyper-media Magpie Book. Their plan is to sell it to other schools to help children with project work, as well as raise money for school funds.

Other discs in the pipeline are Vikings and Halloween. You can contact No Frontiers c/o St George's RC Primary School, Bells Close, Newcastle upon Tyne NE15 6XX.

Cheaper Concept pack

NEWS from The Concept Keyboard Company (0962 843322) is that the A3000 Designer Pack is being offered at £10 off the published price. The pack comprises an overlay designer and editor called the Concept Designer by Longman Logotron and an A3 or A4 Concept Keyboard.

The Concept Designer lets you create overlays easily and can be used with most Risc OS compliant programs even if they were not designed with a Concept Keyboard in mind. The principle behind the development is to allow teachers to make their own overlays quickly and easily to get the most from different types of software.

The A3000 Designer Pack

TouchData is a program which is supplied with the Concept Designer. It is similar to the original Touch Explorer Plus and keeps most of the earlier program's features including multiple windows.

In addition SoftTouch allows teachers to create overlays without a Concept Keyboard attached to the computer.

The pack includes a comprehensive user guide, a mouse emulator and sample overlays including ones for *top bit set* characters used in modern European languages.

Roaming around

CREATOR of the Turtle, Valiant Technology (081-874 9747) are setting up Valiant Education Centres throughout the country.

Coordination is done through the National Primary Centre and selected schools become centres of expertise in Valiant products such as the Turtle and Roamer.

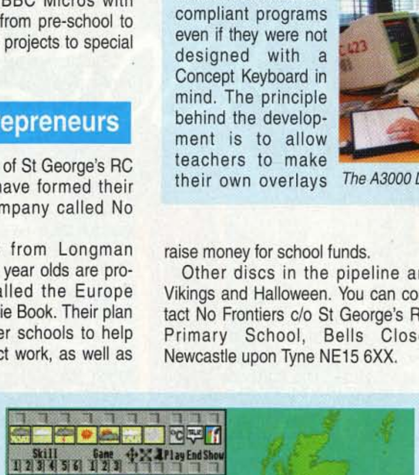
Each school will be equipped with the full range of Valiant products and receive intensive training and support. The first area to participate was the Midlands when five schools began the scheme.

Valiant anticipate that each centre will act as a focus for other schools in their area as well as being involved in the development of educational support materials and projects.

Weathering the storm

BRINGING fun into the learning of National Curriculum Maths, Science and Geography for 5-9 year olds can be a difficult job. However, HS Software (0792 204519) have released Weatherman to do just that. It is available for the Archimedes at £9.95 and lets you make your own weather forecasts just like those on television. Featuring 256 colour graphics, digitised pictures and sampled speech it will give forecasts with that added sense of realism.

Yet Weatherman aims to be more than just a game. There are close links to one of the standard assessment tasks in Science being given during the national assessment of seven year olds in the spring and summer terms.



Breaking the

A new type of educational software? Rog Frost investigates a multi-media approach

FRONTIERS seem to be a concept straight out of the Wild West. In fact, they are just boundaries and if you think of one that's been around for a couple of thousand years you'll be well on the way to knowing what Frontier 2000 is all about – the boundary between England and Scotland, where 2,000 years ago Hadrian and the Romans built the famous wall.

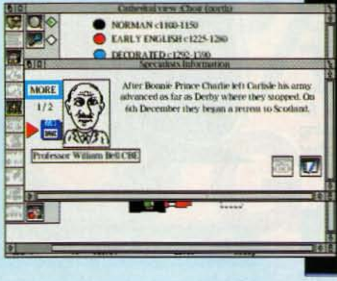
This bulky pack is held together by a neat plastic carrying case. Avid computer addicts may be disappointed to find just two discs with the rest a plethora of support materials to give added depth and breadth to the topic. Fan's of Cambridgeshire's well-known Mary Rose program will recognise the format, though Frontier 2000 is much better as it makes full use of the power of the Archimedes.

Frontier 2000 is essentially about the Romans – a compulsory area of study within both primary and secondary schools. But it goes much further and provides an in-depth study of the history, geography, flora and fauna of the north of England that could find a home in many areas of the curriculum. In fact, the pack lends itself to a cross-curricular approach.

The main part centres around the rather eccentric, retired Professor Hardwick, an elderly academic with an obvious fondness for history and people.

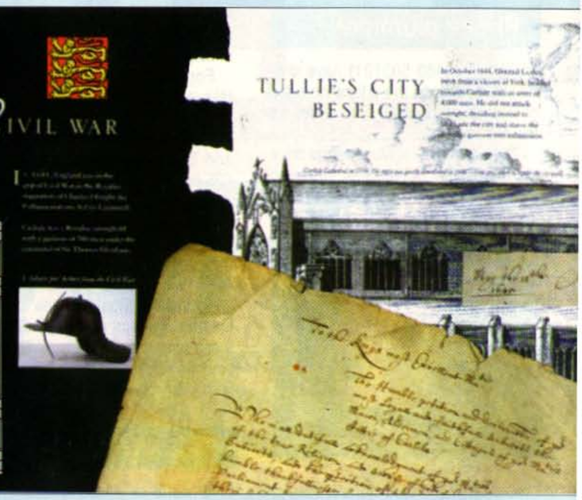
He has set up a number of trails around the Carlisle area covering many aspects of the history of the Border area, from Romans through the evil times of the raping and pillaging Reivers to the civil war and the more recent history of the railways.

Product: Frontier 2000
Price: £95
Supplier: Cambridgeshire Software House, 7 Free Church Passage, St Ives, Huntingdon, Cambridgeshire PE17 4AY.
Tel: 0480 67945
Requirements: Risc OS, 2Mb minimum



After Bonnie Prince Charlie left Carlisle his army advanced as far as Derby where they stopped. On 6th December they began a retreat to Scotland.

Professor William Bell CBE



On the trail trial

Some trails are concentrated in one small location – the cathedral for example, while others involve travelling longer distances – to see Hadrian's Wall or to find the home of the pipistrelle bat.

Your task is to complete one of the professor's world famous but devious trails. You are given an initial clue to a location. This might be cryptic – but not too difficult – or it might involve a grid reference or some missing letters from a place name. You must find the location on the on-screen map – a high quality draw file.

Map strugglers can access an alphabetical list of all the places used in all the trails. Clicking on the name will take your car – a speedy handsome white Porsche – to that location and alter the map display so that the required place is central. Having found the location, you join your car and head along the local lanes until you arrive. This graphical sequence can be turned off when it begins to pall.

If you've found the right place, you will find the professor's question for that location. The chances of you actually knowing the answer are very small. This means you must contact the helpful network of experts in your attempt to dig out a solution.

The experts – who all have names and offer a mix of males and females – are selected merely by clicking on their icon at the side of the screen. Their information is then displayed as text, diagrams and photos for you to examine.

Some experts can help, while others may only offer red herrings on a particular issue. It is often worth reading all the advice, though, since today's interesting trivia could be vital information at the next location.

When you think you know the answer you must return to the Porsche and dial up the prof. If you are right he'll give the next location clue, or offer some helpful advice if you are wrong.

Eleven trails have between four and eight clues. A methodical worker could complete one in 20 minutes or so of real time. In fact, the challenge is set against a simulated time and is very well thought out.

It takes time – even in a Porsche – to drive around the country but in this game it takes no time at all to consult the experts. A time-expensive mistake is to guess answers wrongly. Professor Hardwick prefers those who think, learn and get answers right.

It is possible to save the position of a group or individual, so you can ration groups to just one location per session or allow a limited time span.

Packages for schools can often stand or fall on the strength of their support materials. Frontier 2000 won't disappoint anyone. CSH have rummaged around the resources of the Carlisle tourist information centre and collaborated with the Tullie House Museum to come up with a wide range of goodies.

For starters you could load up the compelling tourist video, to be treated to Sir Michael Hordern telling you all about the history of the area and showing you the beauty of the surrounding countryside. It is full of useful information presented in such a way that people are sure to want to visit the Carlisle area.

Or why not try the audio cassette? On side one, you can sample some local folk songs, sung to a very good standard, plus a lengthy interview with Mr L. Hartley. This interesting chap remembers his childhood around the end of the First World War and, in particular, the way his parents operated the bakehouse in the middle of Carlisle.

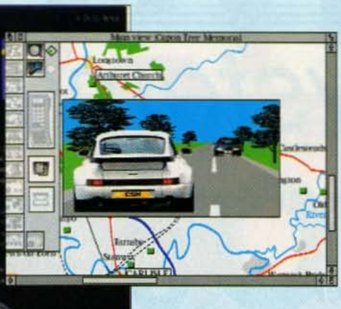
Sounds effective

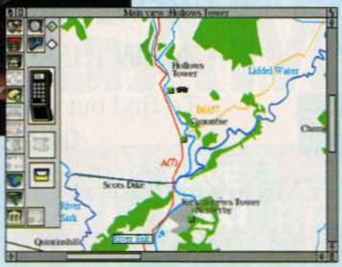
Side two has sound effects from the Tullie House Museum. These cover a good range of local history, from railway announcers, back through the civil war, Reivers and, of course, Roman times. It all makes good listening.

There is even a real artefact in the pack – a small piece of Roman wood. A cynic might say it's much the same as a modern piece but there can be no doubt that it will impress most youngsters.

Then there are the paper and card resources. These include a super range of postcards covering real scenes through to impressionistic railway posters. Some are also included as wall posters.

Not surprisingly, there is a lot of information from and about Tullie House. The museum guide is superb,





bounds

TVLLIE house CARLISLE
YESTERDAYS SHOPPING IN CARLISLE

the colour photos are very well produced and the whole book is a pleasure to read. Along with this goes some information on school parties at the museum and many of the normal tourist leaflets covering other sites or museums in the North of England.

There is a copy of the Leeds, Settle and Carlisle Express. This has some information on the renowned railway line which links the three places plus more tourist information about the Northern Pennine areas.

Along with this copies of the Carlisle Echo are included. This *newspaper* contains headlines and brief stories concerning national events which have happened in the Carlisle area. It spans the 2,000-year period and is a super starting resource for further research.

Perhaps my favourite paper resource is the book entitled *Yesterday's Shopping in Carlisle*. This little gem is a treasure trove of old photos, prints and facsimiles with good clear writing to link it all together.

The software

Finally, there is the program manual. This is a slim A5 booklet which explains the purpose of the program, why it was written and how to use it. Like all good Risc OS software, you'll be able to skip most of that section.

It also contains the answers to all the trails and a summary of the pack's contents. There is a tradition of criticising computer and software manuals for being impossible to understand. There is no problem here as the manual makes very easy reading.

The discs have an awful lot crammed on to them in the way of support resources. Large quantities of worksheets and flyers are all stored in Draw format so everyone can print these to give very high quality paper resources.

If you prefer, for just £15, CSH offer a laser printout of all drawfiles in the pack. For those who need the quality of a laser printer but don't have the hardware, this is a real bargain.

Many of the text files can be printed. The folk songs from the audio tape are also reproduced on disc as simple Maestro files in two versions: One in the original key, the other transposed so as to be suitable for the descant recorder.

The vast amount of information is tidily organised in directories most of which have sensible names. For example, a Beliefs section covers both Catholicism and Non-Conformism. A Grandma directory – a lovely resource for children – contains scanned photographs, birth and marriage certificates and family trees. Then, as expected, there are the historical areas: Romans, Reivers, Civil War and so all. All are superb.

The resources to help with the running of the program are also of tip-top quality. Pages introduce the benevolent crank, Professor Hardwick and the experts who can help users solve the clues and complete the trails. This section also contains a computer competence certificate and a comprehensive topic web.

Two final directories deal with role-playing. These introduce characters and offer suggestions which could be used for drama or for other creative work.

I have one criticism of many of these resources. They have a tendency to be slightly too big for the default Risc OS printer drivers. It may be necessary to alter the sizes of the margins to squeeze everything on to one A4 page.

Moment in time

The biggest disc resource of all is what the publishers call a Time Line. I don't know how this is stored but it is possible to save it all on to another disc as a text file. I thought I'd print it out to see what was in it. I gave up the idea on finding it was 80 A4 pages long.

I would be tempted to describe it as a *comprehensive searchable database*. It is quite staggering to think how much history has taken place in the Carlisle area – history which is still in the making. Among recent entries, for example, are the Lockerbie air disaster and the Queen's visit to open the refurbished Tullie House Museum.

Not all the information is based in the North of England. For example, in the transport section you can learn about Sir Francis Drake's voyage of 1577 from the opposite end of the country.

The time line has all the simplicity we expect from Archimedes software. It is possible to save all or any part of it to disc or output it to any printer.

Summing up

Frontier 2000 is a superb pack. The trails are entertaining and informative, whether used at home or school, and catch the imagination of pupils. It is excellent graphically and simple to use. The additional resources, both on the discs and the other artefacts, are top quality.

The program will obviously appeal to those in the North of England, but I would expect it to be used in schools across the length and breadth of the Archimedes using world.

I predict that the Carlisle area and Tullie House Museum in particularly will see a large increase in school visitors.

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Everyone can play

Marshal Anderson looks at a piece of special needs software

Product: I Can Do It
Price: £49.35
Supplier: Barnardos, Tanners Lane, Barkingside, Ilford, Essex IG6 1QG.
Tel: 081-550 8822
Requirements: BBC B, B+ and Master

SPECIAL needs software is not the easiest to come by. Very few commercial publishers get involved in this field because the potential sales are so small. So it is left to organisations like Barnardos to come up with this sort of package and I *Can Do It* is an excellent example.

It was developed jointly by Barnardos North West Division and Edge Hill College to *"explore the motivation and developmental use of the computer with special emphasis on the sensory elements of sight, sound and touch"*.

They were also looking for something that would be easy to use by the tutor dealing with the child. This can be seen, for instance, in the way all the menus step back nicely through the use of the Escape key.

The programs are divided into three levels, rising in the sophistication of the response required, using a variety of different input devices.

Level one is based on a single switch or its equivalent through the standard keyboard spacebar, concept keyboard, touch screen, single switch or micro mike. The aim is simple: To get the user to respond to the program by pressing the switch.

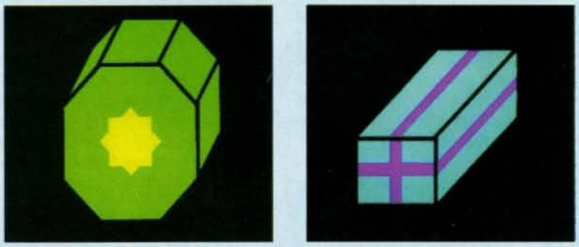
The lowest level

The first group of programs on this level are very straightforward. **Swans** and **Cygnets** have the birds moving left or right across the screen with Swan Lake music playing – volume and pitch are selectable.

First you are told to watch and listen with big eyes and ears – no reading is involved at any stage. Then the procession and music stop regularly, to be started again by the user touching the switch.

Doggy in the Window plays the expected tune. First you watch the dog wag its tail then progress to the part of the program where each touch of the switch makes the tail wag. All the programs cycle through until Escape is pressed.

The second group in level one uses the same input devices but begins to assume some familiarity. **In The House** moves straight on to the touch part where pictures are animated at the touch of the switch.


Presents from the Christmas Tree game

There's a tap to turn on, a glass to fill, a girl to put the face on, a phone to ring, a toaster to use and a teapot which plays a tune. At the end all the pictures are shown. When cycling through again they are displayed in a different order.

The Twelve Days of Christmas runs through the carol illustrating each bit with the switch being used to move on to each verse. **Happy Birthday** takes the child's name and age and draws a cake with the requisite number of candles. Touching the switch lights each candle in turn playing a segment of the tune. At the end all the candles are blown out and the sequence starts again.

Level two uses the standard keyboard, concept keyboard, touch screen and double switch. This time we are dealing with two options and have moved on a stage.

Dylan introduces the idea of two switches, showing a pair of hands on the screen, which are reflected on the overlay. As each hand is pressed it is coloured in and when both have the same colour a tune is played.

You can set this up so that the colours match as soon as both hands have been pressed or to require several presses to match the colours. The tunes are linked with specific colours so you would be able to select a specific tune if you wanted to.

In The House has the same set of objects but this time they appear on the right or left of the screen. You then have to press the right or left switch to get the reward. At the end all the pictures are shown with an accompanying tune.

On cycling through again the objects are in a another order and in different positions. Happy Birthday now re-appears but this time uses the left switch to light the candles and the right to put them out.

Getting harder

Level three moves on to deal with the concept of matching and takes its input from the keyboard, concept keyboard, touch screen, joystick, and Keyboard Technology's Match Box.

In The House this time seems to work best with the concept keyboard. The objects appear on the screen and have to be matched on the overlay. The objects appear in the same order as on the overlay and stay on screen to simplify the task. The joystick option didn't seem to work well at all – a random waggle always seemed to get a result.

Christmas Tree, which doesn't use the joystick, works in a similar way to In The House. Different shaped presents appear on the screen and must be matched from the keyboard, each correct match playing a carol.

The positions on the screen are the same but this time the picture is wiped off before the next is shown making the task more challenging as the relative position is no longer there as a guide.

Happy Birthday uses the same presents in identical positions but all on screen at once. As each present is selected it is unwrapped to reveal the toy within.

Susie uses the standard keyboard, concept keyboard or touch screen. First you watch her make-up and various jewellery being applied. Then you apply it.

The important thing here is that the jewellery is shown as it appears on the screen but the overlay shows lipstick instead of lips and eye-shadow in place of eyes. So the required connection is more sophisticated. By pressing the overlay carefully it's possible to keep the tune going in correct time which is a further reward.

Scales only uses the concept or normal keyboard. The overlay is strips of colour which relate to notes played and the position and colour of the bar on the screen.

The options are to listen, where the eight-note scale is played and colours are displayed, or to play in any way you want. The note is accompanied by the colour and position when playing and the duration of the note can be controlled.

We are dealing with very basic skills and ideas indeed, so the software has very narrow applications. However, to those who can benefit from this kind of activity I Can Do It is an excellent package. The materials provided in the form of overlays are of a very high quality, printed in colour on plastic sheets and the colours match the screen display very well.

The whole thing has been very thoughtfully put together with good, simple control over the way the software behaves, though it would have been nice to be able to save the various options to avoid, for instance, constantly having to select input devices.

The music and graphics are simple and clear giving a bright and cheerful feel to the whole thing. This is just what is needed and the teachers' notes give a concise description of just what the programs are supposed to do.

Summing up

Those who work in this specialised area of education need a wide variety of different approaches to the same set of problems. I Can Do It homes in on a very basic level of skill, simply getting its users to press a switch to produce a response. It then takes them simply and effectively through a set of simple tasks that use that new skill. This is straightforward software with no frills that does the job it sets out to do.

A world of education

Frank Jukes looks into a series for younger children

Product: My World/Simple Stuff
Price: £15 / £7.50 additional discs
Supplier: NorthWest Semerc, Fitton CDC, Rosary Road, Oldham OL8 2QE.
Tel: 061-627 4469
Requirements: Risc OS

THE idea behind My World is very simple, so much so that it would be easy to overlook the effort that has gone into its development. At the basic level, it is a collection of screens that can be manipulated in a fashion that is simplicity itself, but involves a great deal of learning. Also, most importantly, using the package can be great fun.

My World is primarily aimed at special needs and young children. It is based around a central program which is used as the core to control all of the other activities available. Once it is loaded you can select a screen to work on – there are 22 in all. Apart from My World other discs in the series have a variety of themes, some coming under the banner of Simple Stuff.

Once a screen is loaded, the task is to select an object and place it where you think it should go. It is a little like putting a jigsaw together but it goes one step further. Text can be added to the screen and edited or moved to any position. The pieces of the picture are called objects which are copiable or movable.

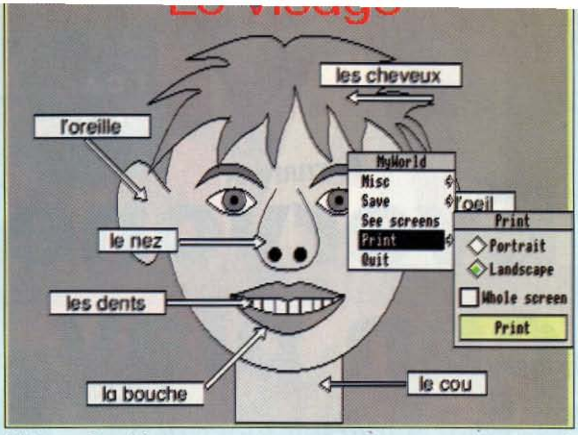
Frog's legs

One five-year old girl found putting the frog back together great fun, while putting Teddy's arms and legs back in the wrong place caused much laughter but even this was obviously using thinking skills.

Other favourites turned out to be the car, lion and weather map. Other screens on the disc would be more suited to older children and included beads, bricks, hexagon, LeVisage, Music, Alphabet, Blocks, Number Patterns, Sentences (1,2,3), Triangles, Punjabi and My Diary.

Screens can often be put back together in a variety of ways – important when using maths and text-based screens. Re-arranging the screens and moving the objects is great fun, but mouse control must be mastered first. Very young children using the program found this more difficult than manipulating the objects.

However, once the mouse was mastered their enthusiasm grew. A small but significant development in the use of My World is the way that the mouse is used to move objects.



Printez vous Français?

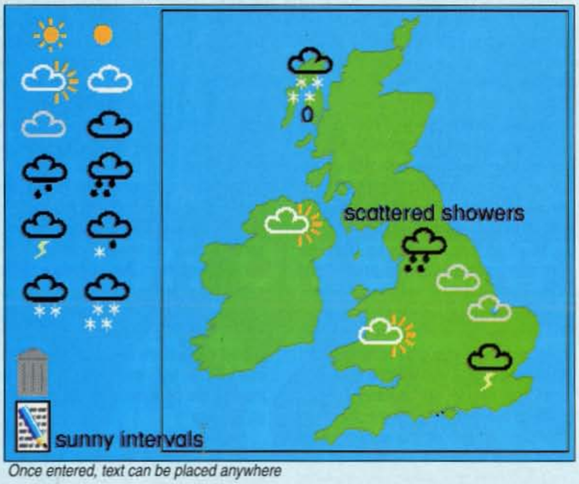
Instead of having to select and keep the mouse button pressed down, the user presses Select and can then let go, move the object to the desired place, then click Select again to place it. Dragging is therefore much easier for children with limited fine motor control.

Painting screens

At the moment, eight supplemental discs are also available. These contain screens dealing with Design, My Town/Village, I'm Special, Nursery Screens, Patterns, Maths, a sampler and Skeletons. All have useful screens for children to use, which can be used as a creative tool or as a reinforcement of a particular topic.

I would imagine older children developing new screens that could form part of a project, while at the simplest level, the screens can be changed and saved. They can also be developed or manipulated using Draw and Paint, saved and printed at any time.

The Teachers' Guide explains how to create your own screen, but if you find that a little daunting, you are invited to jot down your ideas, with sketches, and send them to NorthWest Semerc. This is a thoughtful touch that allows you to develop My World screens even if you do not wish to do it yourself – they must be very nice people in Oldham.



Once entered, text can be placed anywhere

The documentation is a 70-page, A4 sized booklet, intended for teacher use. It is divided into three mains parts starting with descriptions of loading and running. This section takes you through each step of how to load the program itself, which are transferable Risc OS skills, and how to operate My World.

If you have never used an Archimedes before, do not despair, the step-by-step instructions are clear and easy to follow. Diagrams are also included to make life even easier.

Do it yourself

The second part of the booklet contains diagrams of the screens available on disc. This gives you an immediate impression of what can be accomplished and developed by use of each of the screens. Beneath each diagram are a few suggestions and hints of how the screen may be used by the children.

The third part provides step-by-step instructions of how to create My World screens using Draw. Although the documentation is fairly straightforward, it may seem a little fiddly to anyone who has not used Draw before. Additional information about printer drivers, fonts and ram discs is very useful if you wish to get a little more technical and, even if you don't, makes interesting reading anyway.

Summing up

All in all this is a very well thought-out program for use with children with special needs and/or youngsters. Northwest Semerc's considerable knowledge concerning educational realities, creative thinking and software development have combined to produce a very usable piece of software that will be useful to pre-school, infant and primary schools. The documentation is excellent and they have a commitment to further develop screens.

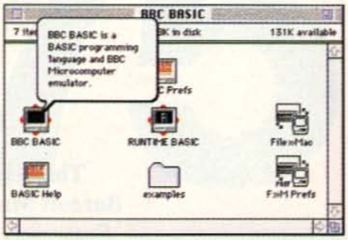
If this was not enough, there is no excuse not to get this package based on price. At £15 it represents superb value for money. If you have access to an Archimedes computer and are involved with young children, or those with special needs either at school or home, this software is well worth having.

BBC BASIC Version 3

Programming language and Emulator for the Apple™ Macintosh™

Combines the power of the Macintosh ...

BBC BASIC 3 takes advantage of the advanced features of the Macintosh, and System 7, to provide an ideal environment in which to develop, test, and run your BASIC programs.

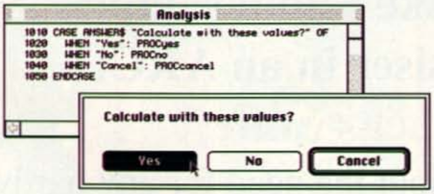

BBC BASIC is a BASIC programming language and BBC Microcomputer emulator.

Balloon help provides instant information about the menus and dialogue-box options.

Save Graphics option saves the BBC BASIC graphics screen as a PICT file that can be loaded into other programs.

Runtime BASIC utility converts your BASIC programs into stand-alone double-clickable Macintosh applications.

Macintosh-style interactive editor provides a scrolling view of program listings with convenient cursor or mouse editing. You can work with any font available on your system and you can display keywords highlighted in bold for easy reference.


```
1010 CASE ANSWER$ "Calculate with these values?" OF
1020   WHEN "Yes": PROCyes
1030   WHEN "No": PROCno
1040   WHEN "Cancel": PROCcancel
1050 ENDCASE
```

Calculate with these values?

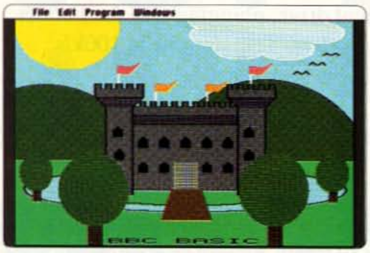
Macintosh Toolbox interface allows you to define your own menus, dialogue boxes, and scrolling lists using convenient BASIC keywords, and use the standard file dialogues for opening and saving data files.

Dynamic tracing and debugging lets you run or step through a program, highlighting each statement as it is executed, and you can display the values of any variables or expressions.

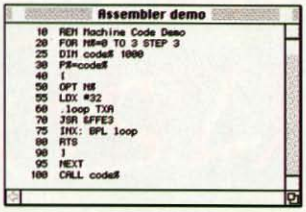
Comprehensive help system gives you instant information on keywords and operators, without interrupting what you are doing.

...with the best of the BBC Microcomputer:

BBC BASIC for the Macintosh gives you access to the foremost educational programming language in the UK, with the ability to run many programs originally developed for the BBC Microcomputer.



Emulates BBC Microcomputer graphics and screen modes, including Teletext. Work in full colour on an LC or Macintosh II, or grey shades on a monochrome Macintosh.


```
 10 REM Machine Code Demo
 20 FOR N%=0 TO 3 STEP 3
 25 DIM code% 1000
 30 P%=code%
 40 [
 50 OPT N%
 55 LDX #32
 60 .loop TXA
 70 JSR &FFE3
 75 INX: BPL loop
 80 RTS
 90 ]
 95 NEXT
100 CALL code%
```

Built-in assembler and 6502 machine-code interpreter allows you to compile and run 6502 assembler programs, or machine code which you have loaded in directly.

Full emulation of the BBC Microcomputer Operating System including all the standard system calls and vectors, OSBYTE, OSWORD, *FX calls, VDU codes, function keys, sound, and DFS/ADFS commands.

Includes File»Mac transfer utility to transfer programs and data files to or from an Acorn Archimedes or BBC Microcomputer.

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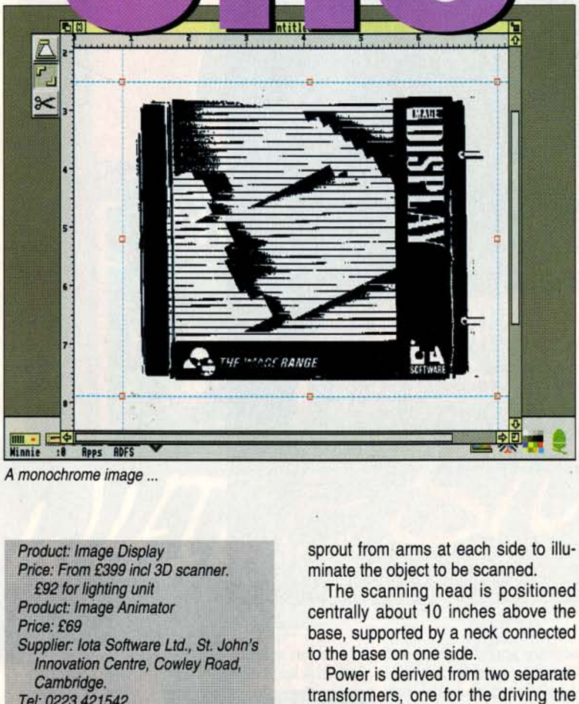
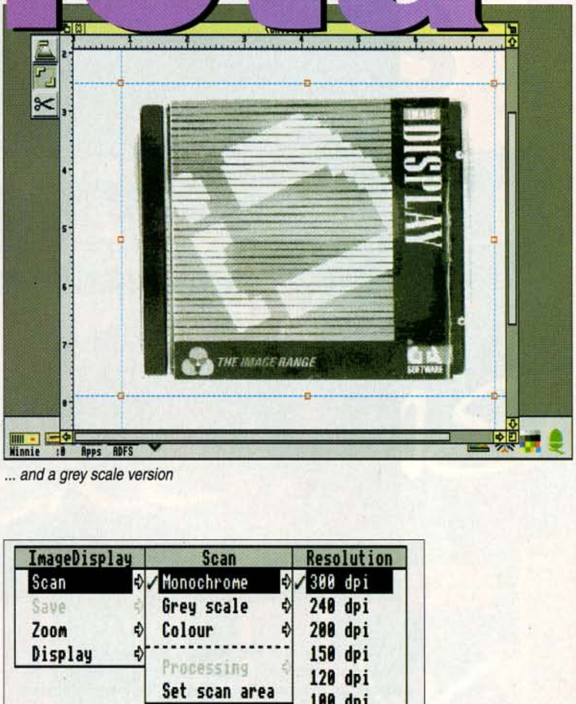


A monochrome image ...



... and a grey scale version

Product: Image Display
Price: From £399 incl 3D scanner. £92 for lighting unit
Product: Image Animator
Price: £69
Supplier: Iota Software Ltd., St. John's Innovation Centre, Cowley Road, Cambridge.
Tel: 0223 421542
Fax: 0223 421543

AFTER a period of apparent inactivity Iota Software have burst back on to the scene with related products that really use the power of the Acorn 32-bit machines.

Image Display is a mono or colour scanner with the unique ability to handle solid objects. Image Animator is a sprite animation package which can be used directly with the scanner or a host of other sources.

The heart of Image Display is the Chinon 3D scanner which comprises a flat base, slightly larger than A4, with ruler markings along two sides. Two detachable fluorescent lights sprout from arms at each side to illuminate the object to be scanned.

The scanning head is positioned centrally about 10 inches above the base, supported by a neck connected to the base on one side.

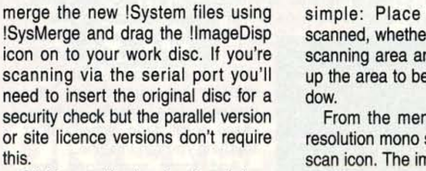
Power is derived from two separate transformers, one for the driving the scanning mechanism the other for the lights which means that the main unit is very lightweight.

The standard unit is monochrome but the colour option is just a filter unit that slides on to the scanning head. The colour unit has red, green and blue filters that need to be switched manually when the software instructs – one filter for each scan. The unit is easy to fit and remove.

At the computer's end a connector card needs to be fitted, which is just a simple parallel interface card and has very few chips.

A serial input version is available which will save using an expansion slot but there's no SCSI version or one that gives input through the printer port.

Software installation is simple: Just merge the new !System files using !SysMerge and drag the !ImageDisp icon on to your work disc. If you're scanning via the serial port you'll need to insert the original disc for a security check but the parallel version or site licence versions don't require this.



300 dpi is just possible for professional use

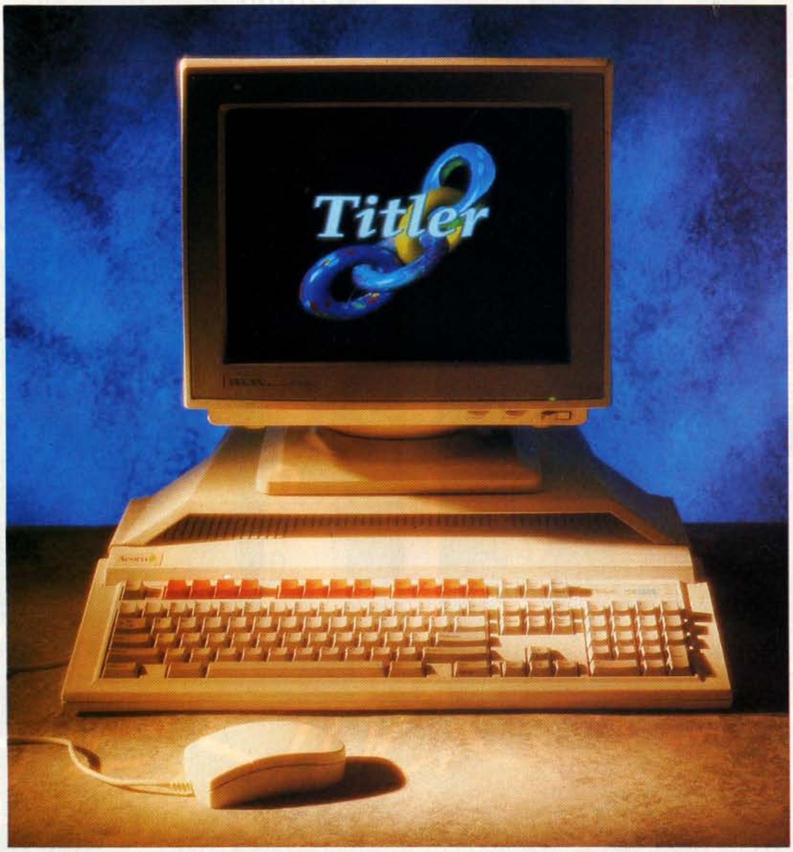
Clicking on the iconbar icon brings up a scan window which has a toolbox with three icons and rulers on the top and left side. The rulers correspond to those on the base unit. The three icons in the toolbox are to initiate scanning, control the scan area and crop the picture before saving.

The scanning procedure itself is simple: Place the object to be scanned, whether flat or 3D, on to the scanning area and use the rulers set up the area to be scanned in the window.

From the menu select a very low resolution mono scan and click on the scan icon. The image will appear very quickly so you can then re-adjust the scan area and perform a scan of the resolution and type that you want.

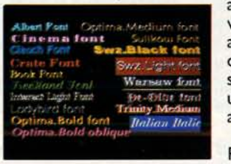
The scans available are monochrome 75dpi to 300dpi, grey scale 18dpi to 75dpi or colour 18dpi to 75dpi. The scanned images are held in memory so a good sized scan at the highest resolution will require a

From the people who brought you Pro-Artisan, Render Bender and Illusionist; another link in the chain.

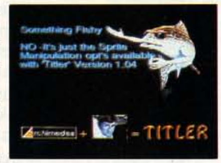


With Artisan II, Pro Artisan, Render Bender and Illusionist you can create amazing graphics and superb animations. But a picture, however detailed and complex it might be,can only say so much.

So with just that in mind, allow us to introduce Titler. It does exactly what the name suggests. It enables you to add words to your pictures. Titler is two programs combined, Titler and Sequencer. Titler is used to create screens containing text of any size and colour. It can provide drop shadows, underlines and rub out boxes. Using Sequencer you can present your screens using effects such as, unroll, scroll, fade, wipe, almost anything you can imagine.


Albert Font
Optima.Medium font
Cinema font
Swz.Black font
Crate Font
Swz.Light font
Book Font
Warsaw font
Ladybird font
Trinity.Medium
Optima.Bold font
Italian Italic
Optima.Bold oblique

Add some animations from Render Bender or Euclid, some music from Sound Tracker and you have an amazing presentation to stop people in their tracks. Add a Genlock board and you can transfer the whole thing to video, overlaying onto any video source just like the professionals do.



Something Fishy

NO - It's just the Sprite Manipulation opt's available with 'Titler' Version 1.04

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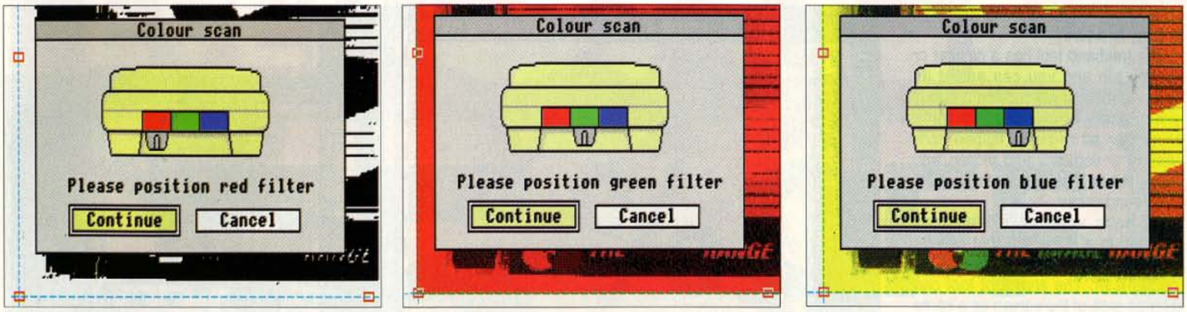


Colour scan

Please position red filter

Colour scan

Please position green filter

Colour scan

Please position blue filter

Building up a colour image using the manually switched unit of Image Display

How it looks on screen...

IMAGE
DISPLAY
THE IMAGE RANGE
CA
SOFTWARE

... and the final result

4Mb machine. The grey scale and colour scans use blocks of 4x4 monochrome scan pixels to put together their pixels.

Colour images are held in 12 bits of accuracy – four bits each for red, green and blue – this gives a maximum of 4,096 colours which is converted to 256 colours for display on the screen, although the original 12 bits are held all the time.

Various parameters, available from the Scan=>Processing=> dialogue box, can be altered to adjust the conversion of the colour image to sprite format.

The processing parameters allow for dithering, which is usually on, and gamma correction. There is a very clear explanation of what gamma correction actually is in the manual, which was even comprehensible to a non-expert, and you need to understand it before deciding to use it.

Because of the way it's constructed – apart from being very robust – the scanner can handle objects up to 3cm in height. This means that books, beads and butterflies are all candidates for the scan.

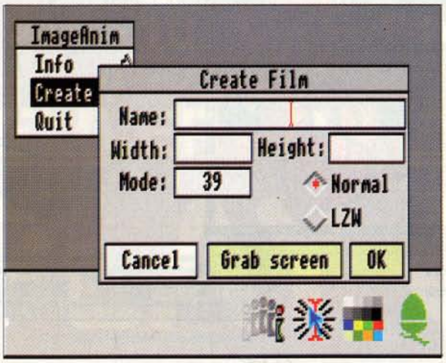
The nature of the scan means that objects near the ends of the bed are viewed at an angle which can be used to advantage in some cases but may result in unwanted distortion.

Summing up

In comparison to mono-only scanners this one doesn't rate high on resolution – but it's certainly better priced than colour ones.

It's very robust making it ideal for the education environment and the pricing makes it very competitive.

If I wanted an A4 scanner for scanning flat pictures I wouldn't buy this one but its amazing flexibility makes it unique, and when combined with the Image Animator it makes an incredibly powerful system.



Name:

Width:

Height:

Mode: 39

● Normal

○ LZW

Setting up a new animation

Image Animator

The most successful suite of animation programs on the 32-bit Acorn machines to date have been those from Ace Computing. But now that crown is being challenged by Iota with the Image Animator.

At its simplest level this application combines a series of sprites as frames of a film which can be replayed at speed. But what really makes any program is the range of tools and how easy they are to use. Animator has clearly been designed with flexibility in mind and there are many ways of getting the sprites into the program automatically.

The application is loaded in the usual way and clicking on the icon brings up an animation window with two toolboxes. The window is of the default frame size – 448 by 176 pixels – in Mode 15. By selecting Create from the iconbar icon you can set the width, height, screen mode and method of compression which can be Normal, which isn't described, or the expected LZW which is slower but more effective.

Along the bottom are the Motion tools which display the current frame as part of the film strip and allow you to wind forwards and back at run speed or single-stepping. You can also jump to the beginning and end.

A frame or group of frames can be selected on the film strip and become highlighted in blue. Editing operations can then be carried out on this selection including deleting, cutting, copying, pasting or saving. The paste function follows the Acorn convention and the currently selected group will be pasted in after the currently displayed frame – there's no clipboard.

Animator possesses its own paint tools and these can be used to produce a simple film, especially as a first experiment. The paint tools window appears when you click the brush icon and gives you an eyedropper for selecting a colour from the screen, a freehand drawing tool, a fill and sprite brush.

The freehand tool has a circular or square nib and you can adjust its size. The fill tool will replace a colour either locally or globally. The sprite brush can be re-sized, flipped horizontally or vertically and plotted with or without its mask, or as the current foreground colour.

As each sprite is added it is included in a sprite file that can be saved separately to the film and reloaded later. The snapshot tool can grab an area of the screen as a sprite either for painting or as a complete frame.

Using the paint tools you can draw on an empty frame then paste it to film. This automatically advances to the next frame then you can add to, alter or delete parts of what was previously drawn and paste that to film and so on. This process can be very fast, resulting in a simple animation.

Using the snapshot facility you can have another application loaded, say Draw, and select an area of the screen that covers a draw window. You can place draw objects in that space, grab a frame, move the objects grab again and so on.

A series of sprites in a single file can be deposited on the iconbar icon to create a new film, or dragged into an existing frame window in order to merge them after the current frame. This method lends itself to creating films based on sprites grabbed from applications using Acorn Replay – although digitised images are less compressable.

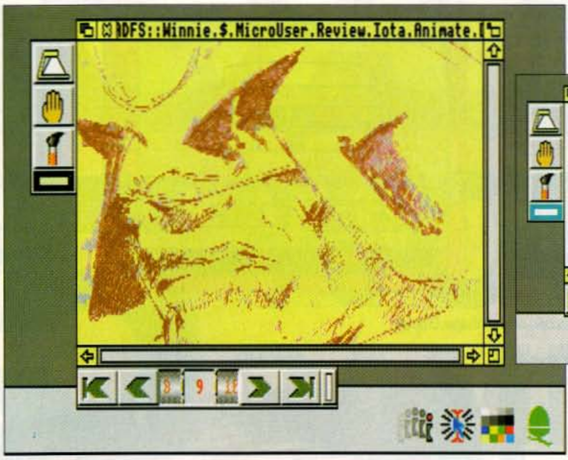
But where this program scores heavily is when used in conjunction with the Image Display 3D scanner. This facility is so prominent that it has its own icon on the toolbox. Clicking it will load Image Display, if it's been seen by the Filer, and open up a scanner window titled: *Scanning viewer for Image Animator*.

This is used identically to a standard scan so you can adjust the resolution and type of scan but a second click on the Animator scan icon initiates a scan and then copies the resultant image directly into the next frame. There's also the option to perform multiple scans at preset intervals.

These facilities open up tremendous possibilities: Time-lapse images of fungus growth, animating blobs of plasticine and so on. The example files show an animated glove and the stages of a piece of toast being eaten. There's also one where card shapes have been moved around.

One thing to watch out for when importing sprites is that the images are scaled to the current frame size which is not always what is wanted. A facility to turn that off would have been appreciated.

The final films can be displayed in a window or on full screen, where they can be moved around to any position as long as the entire frame is on screen. Using a genlock card the animation can be overlayed on to a video signal allowing special effects or titles to be produced.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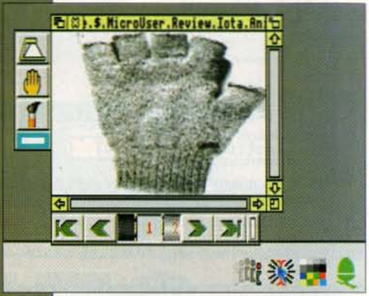
8
9
10

You can animate from scanned sketches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1
2

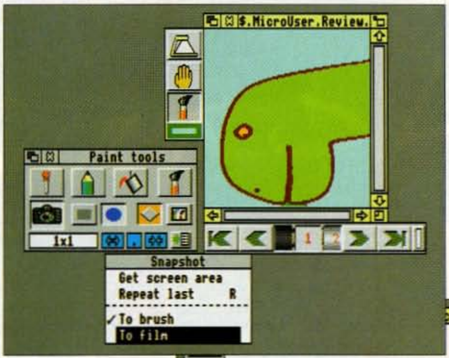
... or solid objects

Summing up

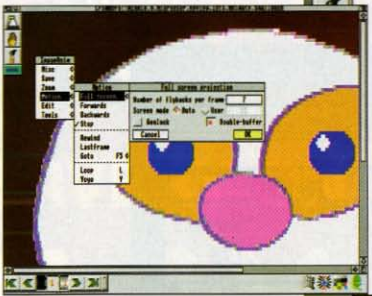
Image Animator is very easy to use and while very simple in concept its possibilities are endless. For example linking to a Canon Ion camera or other digitiser connected to a video camera would allow full 3D animations to be created.

This makes it a very useful tool on any courses involved with animation. At school it provides options both for creative art and in science using the time-lapse facility.

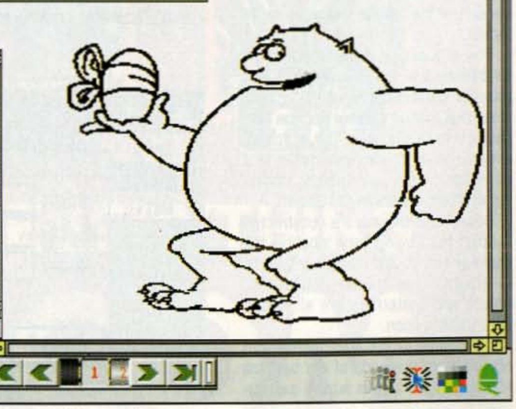
And in the home every one who's ever wanted to produce animations but been frustrated by the complexities and expense now has a realistic option.


$.MicroUser.Review.
Paint tools
1x1
1
2
Snapshot
Get screen area
Repeat last R
✓To brush
To film

Animations can be drawn with the paint tools


Misc
Save
Zoom
Motion
Edit
Tools
Motion
Full screen
Forwards
Backwards
✓Stop
Rewind
Lastframe
Goto F5
Loop L
Yoyo Y
Full screen projection
Number of flybacks per frame 7
Screen mode Auto User
Genlock
Double-buffer
Cancel
OK

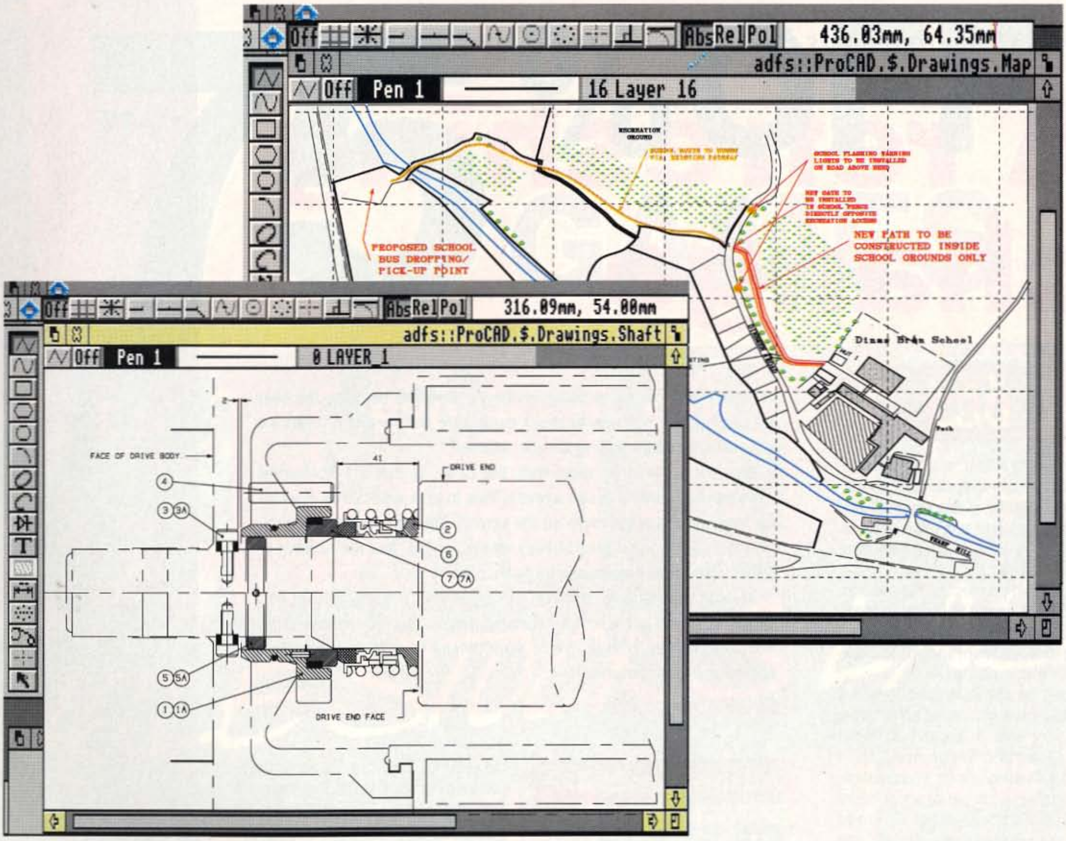
Simple scanned circles can be filled with colour


croUser.Review.Iota.Animate.Test-02
1
2

... or images can be left monochrome

CADet

Multi-tasking
RISC OS Compliant
CAD Program


Off
AbsRelPol
436.03mm, 64.35mm
adfs::ProCAD.$.Drawings.Map
Off
Pen 1
16 Layer 16
RECREATION GROUND
SCHOOL FLASHING WARNING LIGHTS TO BE INSTALLED ON ROAD ABOVE BEND
NEW GATE TO BE INSTALLED IN SCHOOL FENCE DIRECTLY OPPOSITE RECREATION ACCESS
NEW PATH TO BE CONSTRUCTED INSIDE SCHOOL GROUNDS ONLY
PROPOSED SCHOOL BUS DROPPING/ PICK-UP POINT
Dinas Brân School
Off
AbsRelPol
316.09mm, 54.00mm
adfs::ProCAD.$.Drawings.Shaft
Off
Pen 1
0 LAYER_1
FACE OF DRIVE BODY
41
DRIVE END
④
③③A
②
⑥
⑦⑦A
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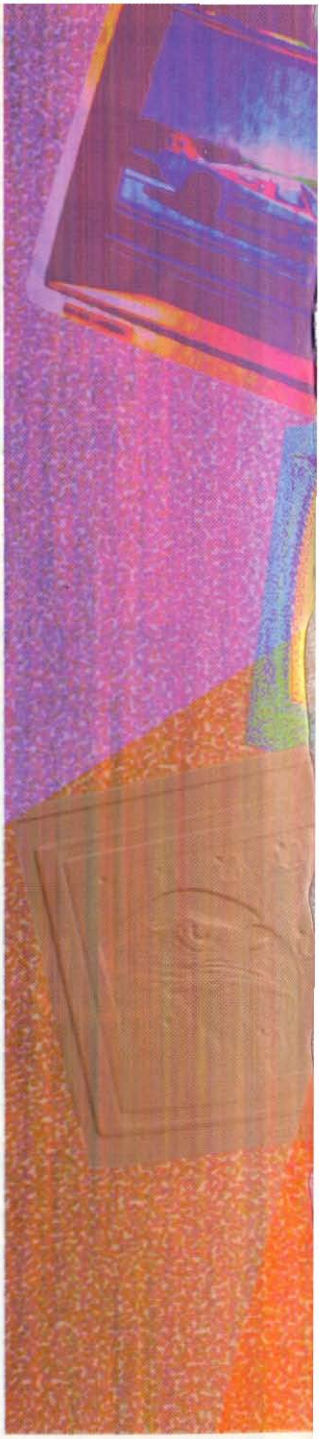
Ian Ashley takes his hat off to the multisync monitor

A refreshing change



YOU may hear people praising multisync monitors as being the best for computing. But they're more expensive than ordinary ones so what are you really getting for your money?

The real difference, apart from the price, is that the horizontal lines can be drawn at faster speeds. This in turn means that in a single frame you can get more on the screen. You can double the vertical resolution so you get 512 lines instead of 256, and the number of pixels across the screen can be pushed up as well.

So with a multisync monitor – plugged into a machine that can handle it – you get a much improved display and the whole thing should look a lot crisper. We've taken a look at several of this type and here are our observations.

AlphaScan and PanaSync

There is very little to choose between these, as they have identical specifications. Both have the usual tilt and swivel stands and anti-glare screens, and the colours are solid and even with no noticeable patchiness.

Their main problem is that the contrast control needs to be set to maximum for normal use which leaves no scope for adjustment should the background lighting change.

Edges on the PanaSync have the poor crispness you would expect from a monitor with a larger 0.31in dot pitch. This is disappointing for a model with such a high specification. It also takes a couple of seconds for the PanaSync to react to mode changes whereas the AlphaScan reacts instantaneously.

The largest mode supported by the Watford VIDC enhancer – 1152 by 448 pixels or 144 by 56 characters – cannot be displayed on the PanaSync due to the line rate needed. The AlphaScan, however, can cope with this even if the pixels do blur slightly at this resolution. The mode is still readable though.

Product: AlphaScan Plus
Price: £325
Product: Super VGA VIDC Card
Price: £45
Supplier: Watford Electronics
Tel: 0923 237774

Product: PanaSync C1381
Price: £445
Supplier: Panasonic
Tel: 0344 853943

Autoscan 2038

Microvitec are best known for their M series Cub and the Cub 3000 monitors but they have now entered the fray with an excellent 20in model – the Autoscan 2038.

It is very sturdily built with a swivel and tilt stand incorporated. However it is very heavy at 35kg and should not be placed on top of an Archimedes, which is only guaranteed to take a maximum load of 25kg.

The 2038 can accept almost any type of input via its vast array of connectors and intelligent circuitry. There are two 9-pin D connectors and 10 BNC connectors. The first D-connector is a combined TTL/analogue input which auto-senses the type of input. The second is a dedicated analogue input which can handle either sync-on-green or separate/composite syncs.

However, for the monitor to sync correctly with a pre-A5000 machine it requires the vertical sync to be pulled to ground. This can be achieved by connecting pin 5 to pin 9 in the monitor lead. The 10 BNC connectors are split into two groups, five being used for input and the others being *looped through* to allow a slave monitor to be connected. Each set of BNC connectors consists of red, green, blue, horizontal sync and vertical sync.

Two into one

If you own two computers, for example a PC and an Archimedes, you can connect them both to the monitor at once. A switch allows you to select which input will be given priority if both are turned on.

Along the bottom of the screen are the on/off, brightness and contrast dials. A degaussing switch is used to demagnetise the screen should any colour impurity appear due to, for example, the monitor being moved.

On the front beneath the screen on the left are the controls for the Digital Memory Sizing (DMS) system. This is the easiest to use and most powerful system I have ever come across for controlling the display attributes. Using the control buttons the size and position of the display are quickly and easily set and then stored in the monitor's memory.

A different set of display attributes are recorded for every combination of horizontal and vertical frequencies, vertical sync pulse width and the type

of sync signal. This means that you will not need to continuously adjust the display attributes when you change screen mode. If you want to use VGA or SVGA modes either on an A5000/A540 or on another Archimedes with a VIDC enhancer, you will find the DMS system has already been programmed for them.

Although the dot pitch is larger than on some multisync monitors the display is still sharp and no *colour separation* is visible.

Text is very clear with crisp edges especially in the multisync and SVGA modes. In an SVGA mode or a very large version of Mode 12, as provided by a VIDC enhancer, two A4 DTP pages with 14 point text can be read side by side. However, these modes have high bandwidths making an ARM3 virtually essential. If you have an A5000 or A540 they're a delight to use.

Graphics are equally impressive with sharp, bright colours although some very slight horizontal blurring occurs. There is no sign of flicker or wobble between neighbouring colours, however on the monitor provided for review the guns were slightly mis-aligned towards the very top of the screen producing a small rainbow effect on the border.

The refresh rates of the VGA, SVGA and multisync modes are faster than the standard modes so the display flickers less although it is still noticeable from close-up due to its larger size.

The faster refresh and the anti-glare tube helps to reduce eye strain when using the monitor for extended periods.

Product: Autoscan 2038
Price: £1,499
Supplier: Microvitec
Tel: 0274 390011

Super VGA VIDC enhancement

Both the Aries AlphaScan Plus and the PanaSync C1381 require the Watford Electronics Super VGA VIDC enhancer to work on any Archimedes except the A5000 and A540, which already have the necessary hardware. It is provided free with the AlphaScan.

Like the standard VIDC enhancers, it permits the clock rate of the VIDC chip to be increased allowing larger screen modes to be displayed. However it also allows the composite sync signal to be split into separate horizontal and vertical syncs and their polarities to be changed under software control. These extra features are required to use VGA and SVGA monitors.

The VIDC enhancer consists of hardware and software. The hardware is a tiny PCB with two crystals (25.175 and 36MHz) and several flying leads attached. The PCB is simple to install on an A400/1 or A3000, requiring no soldering, although you will have to remove the backplane and any podules. If after reading the clear instructions you feel unable to install the enhancer, any approved Acorn Service Centre should be able to do it for you, although a small charge may be made.

On A300s and older A400s a service is required to install two headers before the PCB may be fitted. Any approved Acorn Service Centre should be able to perform this, once again for a small charge.

After installing the hardware, the monitor needs to be connected to the computer. This is not as easy as it sounds because VGA and SVGA models have 15-pin D plugs. A connecting lead is required to convert the 9-pin output on the Archimedes to 15-pin – unless you have an A5000 – and again is provided free with the AlphaScan. The pin connections of the required lead are in the enhancer manual.

When the computer is next turned on the monitor type will need to be set accordingly. This is done by holding down a key on the numeric keypad during power on. While this is explained in the manual it is at the back and would have been better placed just after the section on installation.

Version 1.10 of the software allows any suitable Risc OS mode – including Risc OS 3 ones – the now standard Computer Concepts modes and the Aleph One VIDC enhancer modes to be used. The last allow resolutions of up to 1152 by 488 in 16 colours or 960 by 384 in 256 colours. The software is available separately for use on the A5000 and A540.

Summing up

There are quite a few multisync monitors on the market and if you are unsure if one is multisync or not, check the price and also the H and V scan frequencies. If there's a range of values, rather than a fixed value, it's a multisync monitor.

Not all models are suitable for the Archimedes so buy through an Acorn dealer familiar with the hardware requirements. Make your decision based on what you see when you look at running applications.

Check the location of the controls – will they be within arm's reach on your desk? What about size, will it fit on your desk, is it too heavy to move around, will a tilt and swivel base help? Check what additional features are supplied but above all, base your decisions on what the monitor will be like in use, not how *high spec* it is.

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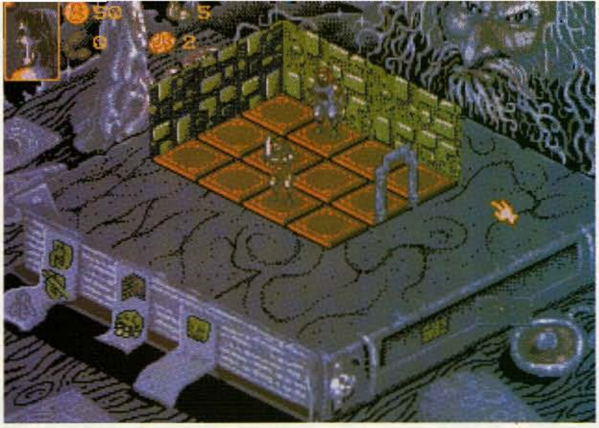


Hero Quest should look like this.

From here to eternity

The Acorn representation at the European Computer Trade Show was small but perfectly formed. There was a wonderful A5000 and an A3000, and next to the A3000 was a French-looking fellow talking to another chap. Ah-ha, this is the man I want to interview.

It turned out that this guy was called Frederic Nespoulous. He was the co-author of a new mega space adventure to be released by our inimitable croissant-chomping chums, Eterna. He was showing off various parts of the game to another nefarious journalist and me. I shall explain the basic plot of the game (I think).

You have to save your planet from total destruction by a nasty star that wants to explode. Okey-doke. You get to travel to various planets and complete missions that will eventually stop your star exploding – and here's the twist: The game has its own clock and you have only got one week of game time to complete the 256 missions.

A 2D Galaxy Map shows the 15 planets you can visit. It looks real cool with loads of scaled sprites 'n' things. When you choose your destination – which can't be too far away – you have to enter hyperspace.

This isn't a nancy-boy hyperspace like the Elite one where you just press a button and wait. Instead you guide your ship through a squirming tunnel viewing from behind and the idea is not to touch the walls.

The tunnel moves very smoothly and the effect looks wonderful. The full version of this bit should hopefully have shadows to make the piloting slightly easier. Once out of hyperspace and on to the planet's surface, you are greeted with a Zarch-like view. But there are a few fundamental differences.

Firstly, instead of just having a small part of the screen with the surface in it, the terrain goes right to the edge – more like Air Supremacy with hills. Then there's the sky, dithered blue in this case. In fact, there is quite a lot of dithering in this section, to make up for only using 16 colours. This is no problem though, as these do the job splendidly.

As well as the undulating terrain, the water has shape, looking kind of *wavey*. Frederic claimed that in the full game, you could go underwater, in the air and also on the ground. And, dare I say it, bitmaps or scaled sprites can be pasted on to the squares that make up the terrain. Instant carpet-o-vision!

Oh yes. If you decided to go to a place called Algol, you would be greeted with a trench. No ordinary drainage trench, oh no. This trench is like the one at the end of Star Wars (Part IV, A New Hope), using wire-frame vectors moving at 50 fps. You too can pretend to be Luke Skywalker: "I'm going in, I'm going in fast. That should keep those fighters off my tail."

Luke then gets a lucky shot in that just happens to dip violently into the waste disposal shaft and destroy the entire Death Star. Good shot Luke.

The presentation is slick, with a rotating disc thing prompting a disc change and a light source-shaded rotating planet where you can actually make out the seas and continents. Smart.

Here's the bad news, for the three discs you are going to have to pay between £35 and £40 and you'll have to wait until October to get your filthy mitts on it. By the way, the game is called something like Aldebaron.

What else did my French friend have to show us? Well, there was an animation system that looked very impressive. You can view a bloke from the side who could rotate his limbs and be scaled in and out perfectly smoothly. He looks pretty life-like and can be programmed to do little things like scratch his head. The system is vector driven and I am sure that it can be put to good use.

He said that **A Thing of Darkness** would be released at the AU Show: The game is a massive role-playing adventure and it has been in production for well over a year. Sounds good. And a Bubble Bobble-like game is to be released at the same time. It's going to be called **Sally & Wally** – fair enough.

While at the show, I had a little go of forthcoming Krisalis products. There was a working version of **Gods** which played wonderfully well – a couple of months until release though. There was **Nebulus II** which was testing to say the least. I am also aware that **Lotus Sprite** may be coming out in the distant future – a top notch car game. **Hero Quest**, the popular RPG board game, is also an option.

The last thing that Frederic said to me was that from now on Eterna would concentrate on *big* games. It's funny isn't it, these European types aren't very good at rugby, but they can sure put together a mean computer game.

Ben Reilly

The Trial

We are in a courtroom. The infamous Ben Guilty Reilly is in the dock. The trial has been going on for, well, three or four minutes. The jury has reached its verdict.

JUDGE: Will the jury please give its verdict.

FOREMAN: In the matter of the World against Mr Reilly, we find the defendant guilty.

JUDGE: Mr Reilly, this is a very serious crime that you have committed. As we all know, in our liberal (He shudders at that word) society, there are very few crimes that rate the death penalty (His right eyelid twitches). These are Treason, Piracy, and Thinking that there are only two Bitmap Brothers. And you have been found guilty on the latter charge.

MR REILLY: But it was a mistake!

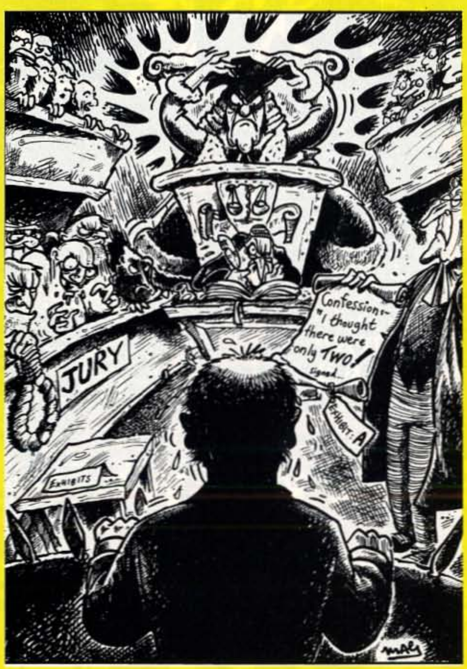
JUDGE: Silence! I shall now pass sentence.

ENTIRE COURTROOM: Go on! String 'im up!

JUDGE: Yes, that seems the only sensible course of action. Any last words?

MR REILLY: Well, I was just saying to my friends at the Lodge the other day...

JUDGE: Case dismissed.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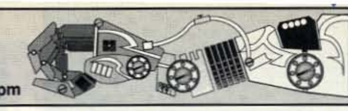

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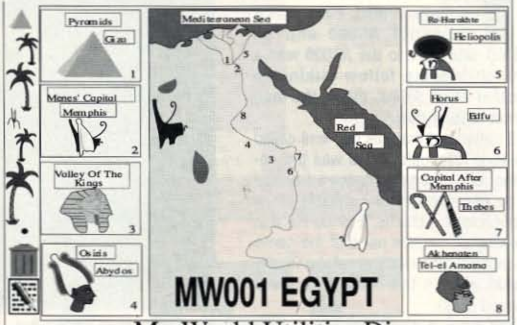

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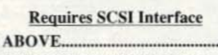

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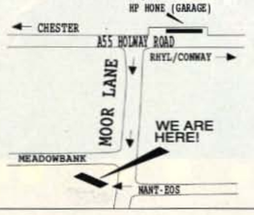

Diary
And Year Planner

The original Arthur operating system came with a diary application; unfortunately Risc-OS lost that very useful little utility. !Diary offers you all that the original program had and more: you can browse and search through your diary, customise it to remember family anniversaries, and create diaries and print out planners for next year long before they are available in the shops.

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!Condense is a Spritefile Compression utility, it will allow you to store more files on disc or in memory. Unlike most routines unpacking is not done on loading, but as and when you are ready to display or use the Sprite(s) in the spritearea. This means that a large number of sprites can be loaded into memory, unpacked to the same 'User Sprite Area' and plotted using normal Acorn Sprite Calls. An example of this is in a demo file (!Condemo2) on the disc and can be seen running. This loads in approximately "THREE MEGABYTES" of sprites but uses just over 400 Kilobytes of discs space or computor memory. Can also be used within your own programs for really fast sprite manipulation.

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The Legend of the Lost Temple

... down in old Peru

Price: £24.95
Supplier: Eterna, 13 Denington Road, Wellingborough, Northants NN8 2RL.
Tel: 0933 279300
Requirements: Risc OS

IF you like adventure, danger, puzzles plus brilliant graphics and scintillating sounds take a look at Andrew Catling's latest creation, The Legend of the Lost Temple.

The location is Peru and here living peacefully for thousands of years is your tribe. A group of archaelogists have brought a virus to the tribe and soon only the young villagers are left unaffected. Hope lies in an old story remembered by Kanu. This legend tells of a lost temple and the secret of life. Kanu sets off to find both.

There are similarities between Legend and Twin Worlds – cute character, flying baddies and things walking back and forth. But where TW had two alternate areas that only scrolled horizontally Legend has a massive screen area that scrolls both horizontally and vertically. Curiously having a primitive man climbing up and down primitive ladders gave an impression of that wonderful game Frak! on the Beeb.

There are 11 levels to traverse before you finally reach the Elixir of Life. Each level is full of monsters, traps and puzzles – perhaps Peru is not such a good place for a holiday after all. But with gems, shields and potions to help Kanu he seems to like it.

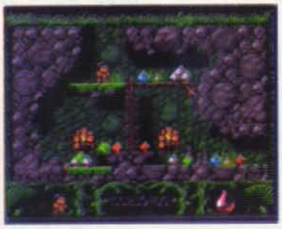
You start in the forest with annoying eagles knocking you into pits until you work out their flight path. Then all you have to worry about are the insects – wipe out their home and they stop appearing.

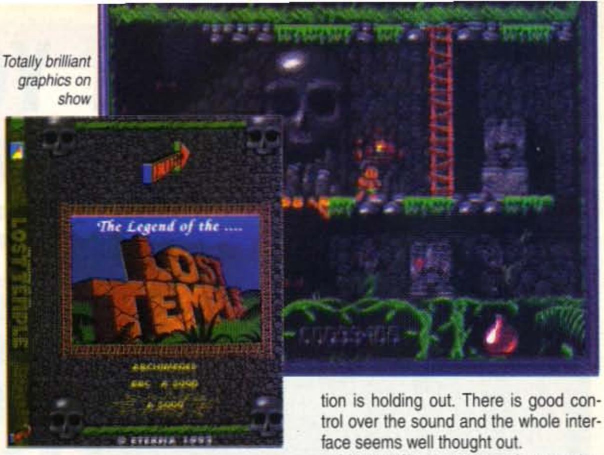
Later cavern levels replace the eagles with bats and it is very frustrating when you have just managed to figure out how to avoid some very elegant marbles and some ugly nasties dump you back where you started. You have four lives and you'll need them especially if you come across the secret exits to treasure or to a bonus level.

From skull mountain you move into the cavern system and you have to work out a tortuous route to the Temple via huge scorpions, pesky bats, green blobs, more bats, unstable stalactites, stakes, dodgy bridges and yet more bats.

The graphics are superb, if you were impressed with the golden eagle on the first level you'll love the smooth animation of the blob and marbles, the graffiti on the walls and the flickering torches. Totally excellent.

For my taste the insects and bats I found increasingly irritating and they did mar the game to some extent. The secret is to keep moving because they slowly home in on you and every contact drains your life blood. But when you are precariously perched on a ladder suspended over nothingness trying to work out how to get to a switch which will place a floor between you and death this is easier said than done.


Spot the Frak! Ladder



Totally brilliant graphics on show

The puzzles will please anyone hankering back to Imogen days and the less able player can at least enjoy the scenery as you drop to your death. There are a lot of gems to collect and throwing axes at the bats may not help a lot but it relieves frustration.

On the options screen you can choose between keyboard, joystick or mouse as well as specify the keys and so on. A save-able scrolling high score table can hold your pathetic offering if you choose. Best of all is the ability to start on one of several levels. I would suggest that you start at A and work up because it's a good way of developing the skills and reflexes you'll need on higher levels.

The playing screen is large enough with animated icons depicting the direction Kanu is moving in, a tally of your score and how the old life blood situation is holding out. There is good control over the sound and the whole interface seems well thought out.

Many different types of protection systems have been tried over the years. This time Eterna have used the match-the-colour system – just don't lose the keystrip. It's not too time consuming and doesn't irritate as some systems can.

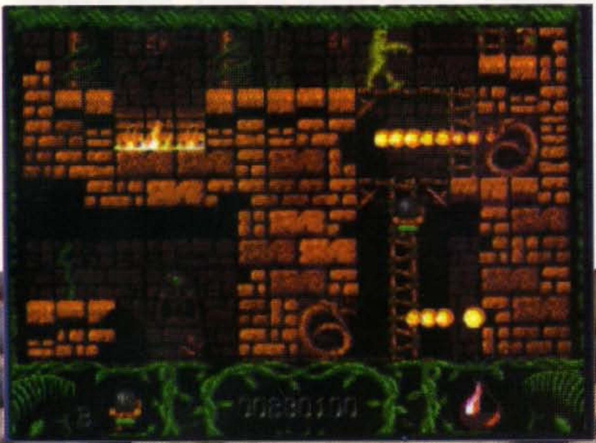
The game can be installed on your hard disc which is a useful option. It objected quite strongly to not having ADFS as the default filing system so the usual fix of:

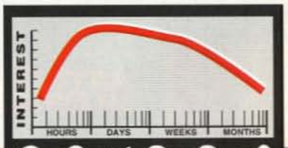
```
*dir adfs::0.$
```

worked and from then on it was plain sailing. You can bypass the credits with the spacebar but they're worth reading once.

There is perhaps little new in the world of arcade adventure. But what this game lacks in originality it most certainly makes up for in graphics, sound, polish and sophisticated programming and not a little of that elusive addiction factor. Seriously recommended if you don't want to sleep.

Steve Turnbull





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Paradox

... beebs in space

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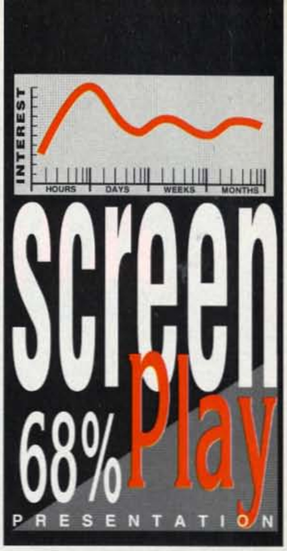
Supplier: TCA, 39 Carisbrooke Road, Harpenden, Herts AL5 5QS.
Tel: 0582 761395



Another game for the good old Beeb? Perhaps that *is* a bit of a Paradox. It is good to see another new software house supporting our favourite machine.

Paradox is a sort of space strategy and shoot-'em-up game. It is set in the future – the year 2641 – when a Universal Field Physicist called Hugard has invented a time travel machine. His first experiment used a black hole and was intended to take him back just three seconds. Unfortunately this failed and he ended up in the year 2141 with no fuel, but at least his black hole was still around.

Your task is to help Hugard to return to his own time by mining into rocks to release the super energy source called Arionite. If enough of this is returned to the black hole, a leap of 10 years can be made.

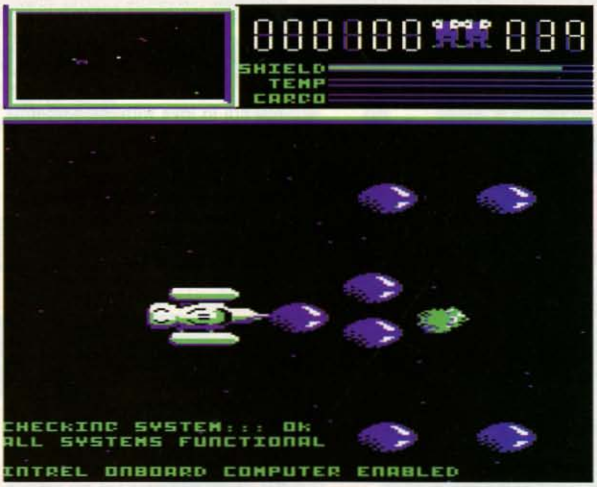
On loading you are presented with a neat screen which fades into the main menu. The notable feature of this is the very smooth, vertical scrolling message. A tap of the spacebar will then lead you to the main game.

The screen is fairly simple – the bulk is devoted to the main display. This shows your space craft in the centre and a background of stars. These are on different planes so that parallax scrolling actually takes place – eat your hearts out 32-bit users!.

The top of the screen holds the long distance radar scanner which enables you to locate the vital energy bearing meteors. Also a bar chart display shows the state of your shield, how much energy you have and the temperature of the nearest rock.

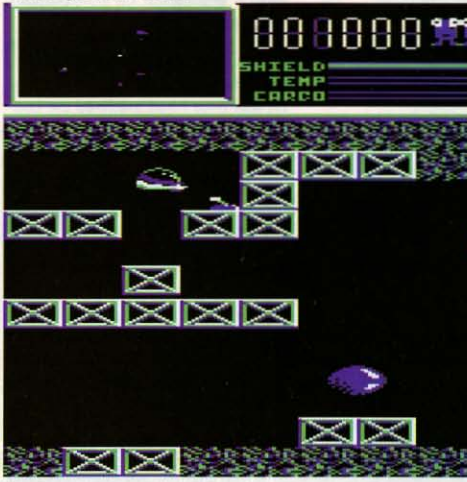
Why the temperature? Because you have to warm rocks up to release their energy. You heat it up by zapping it repeatedly with your laser gun. When it has got white hot you ram into the rock. This allows your craft to absorb the vital essence which can move you on in time. Three or four rocks worth of Arionite need to be collected for each 10 year time warp.

To start with this seems very easy. The rocks don't move. You can steer your craft to them, fire the laser and collect the energy. As you advance in time, though, the going gets a bit tougher. First, you are subject to a serious shortage of time. There is no opportunity for admiring the scenery. You must get your vehicle into position and zap rapidly. In your haste, it is all too easy to come into contact with a rock and this will swiftly drain your shield energy. Running out of time or shield energy will lose you one of your three lives.

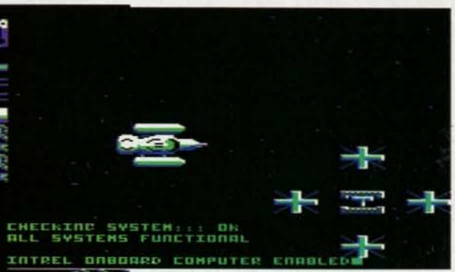


CHECKING SYSTEM::: OK
ALL SYSTEMS FUNCTIONAL
INTREL ONBOARD COMPUTER ENABLED

How do I get to that asteroid?

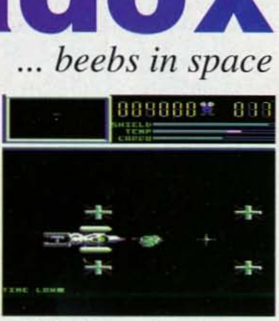


Into a control tower


CHECKING SYSTEM::: OK
ALL SYSTEMS FUNCTIONAL
INTREL ONBOARD COMPUTER ENABLED

Is this a dummy?

Multiple teleports...


... help to solve the puzzles

Then you start encountering the debris that the Antarius Construction Crew have left around the place. Girders get in the way although some of them can be driven through.

The dreaded centralisers will instantly return you to the centre of the screen by the black hole, wasting a load of time. There are mines to avoid, floating balls which hit your shield for six and slip zones which knock you off your desired course. Some items, though, are helpful. Some seemingly unreachable rocks can be accessed by means of transporters. If you can find plungers, which explode dynamite, you can blast your way into other difficult spaces.

Other screen items will appear, particularly as you near the year 2641, and you will have to discover their purpose. Some are invisible while others move around. Altogether, there are 50 levels of steadily increasing complexity. These are grouped in tens and completion of a set will allow you to learn the password for the next collection.

The screen display is simple and limited in colour but the speed and smoothness of the scrolling are really very good. Some sacrifices have been made to obtain this quality and perhaps the worst is that the craft always points to the right and can only fire right. Having said that, it is very adept at flying up, down and backwards and this means it is relatively easy to manoeuvre it to the required position.

Sound effects, which can be turned off, are quite good and meaningful, although I'm not too keen on the little tune which accompanies the menu screen and high score table. It struggles to keep going if the computer has any other task to deal with.

Any 8-bit users, starved of new games, will probably leap at something different. Paradox is certainly different and combines a number of gaming elements.

Even so, it lacks addictiveness, perhaps because the time allowed to complete each screen is frustratingly short and leads to too many re-starts.

If it were budget-priced I could thoroughly recommend Paradox, but I think it is too expensive at its current price. It's the sort of game which will come out of the box from time to time as users attempt another level rather than one for consistent and regular use.

Rog Frost

Price: £14.95
Supplier: Dabs Press, 22 Warwick Street, Prestwich, Manchester M25 7HN.
Tel: 061-773 8632
Requirements: Risc OS

Aliped

... a spoonful of sugar

RIGHTING wrongs is the stuff from which many a good adventure game is forged, and this is just the case with Aliped. You are in love with the gorgeous princess Natasha and are bent upon marrying her as soon as maybe.

However, Natasha has an evil stepmother – wherever would we be without those dear creatures? – who is hell-bent on forbidding the Banns.

Evil step-mum had this little wheeze of an idea: Turn you wing-footed like a bat and imprison you in a deserted castle where you are doomed (doomed, I say) to roam, at the mercy of traps and puzzles, until you eventually die or get killed off.

In the meantime, evil step-mum is intending to marry off Natasha to some totally unworthy rotter in five days' time. Singing – a little plaintively, admittedly: "Oh where, oh where has my antidote gone?" you set off on your perilous searches.

The game is playable either via the mouse or the keyboard: I confess I found the wimp setup the easiest to get on with once I had mastered the business of moving my man around. But it took me a little while to stop him at precisely the right point to enable him to move through doorways. Picking things up requires some concentration as well.

Thirteen icons surround the playing area activated by pressing the middle button of the mouse. The functions include starting/killing the game, saving and restoring a position and – most importantly – a number of actions which can be performed with either hand, such as taking, throwing and dropping.

The accompanying sound effects which occur from time to time are excellent quality and Felix Andrew, the author, recommends plugging your machine into a stereo. I couldn't try that because my computers live in my study while the stereo inhabits the sitting room: Even so, I was decidedly impressed with what I heard.

Graphically, you have a sideways view of your environment, and the scrolling is multi-directional and nice and smooth. I particularly appreciated the animation of Aliped as he whisks his way up and down stairs in search of the vital ingredients which will set him free. In this sense I was reminded of that vintage adventure **Lords of Time**.

There is one crucial factor to successful – and free ranging – mobility throughout the castle and that is the existence of a large number of keys identified by letters of the alphabet. They are specific to certain doors, and therefore it is important to begin your explorations with the idea of accumulating keys as well as items which will eventually provide the antidote to the spell.

While on the subject of keys, I think one thing should be made clear: Doors come in two species which, fortunately, are readily identifiable. Those which directly face you and are locked tend to have re-usable keys. Those which are sideways on and locked have a tendency on the other hand to devour your key as you use it. As a matter of policy, therefore, you should make careful notes as to what key works where while you undertake preliminary explorations.

Because of the way Aliped is set out and because different areas of the castle are identified on screen by name, mapping is relatively easy and this is a factor in saying that beginners to adventuring will find life not too difficult, though some of the puzzles are on the tricky side.

It's time to move into coded clue mode as I drop a few, hopefully subtle, hints as to how certain areas of the game can be mastered. First, you should note that those things aren't just empty suits of armour, they are guards whose motto is: *They shall not pass* on certain occasions.

If you find yourself hampered in this way, it is because you are carrying contraband. To identify it, think of a Swiss folk-hero and to figure out how to outwit the guards think of a team game more or less peculiar to Ireland.

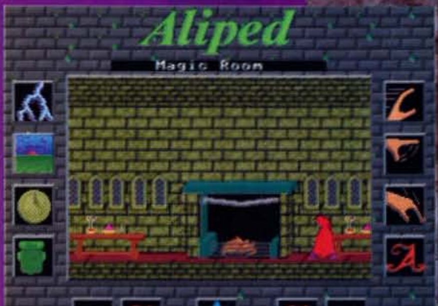
There are times when you will encounter levers: Remember my oft-given advice, on saving prior to indulging in any potentially dangerous activities. Having said that, levers *are* for pulling, you know, so don't be pusillanimous.

Remember, too, that while groping – not *that* kind – is permissible in this particular adventure, a light source is preferable and can be found in that area where the two contradictory proverbs concerning many hands and a plethora of cooks apply.

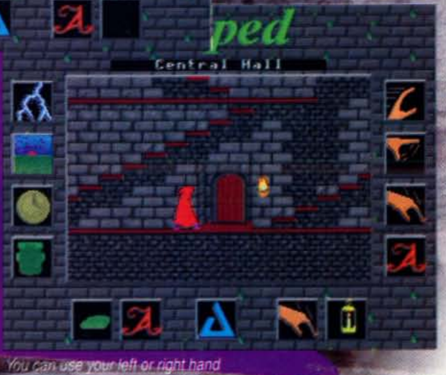
Finally, an important ingredient – so far as your cure is concerned – can be identified by referring to the Book of the Prophet Ezekiel, chapter 37. I shan't tell you where this ingredient may be found, though.

Aliped is excellent value for money, and arcade adventure enthusiasts will share my appreciation.

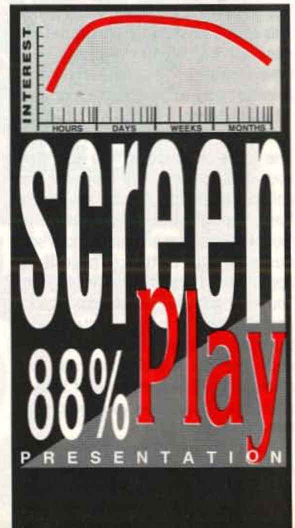
Mad Hatter



Listen out for the fire



You can use your left or right hand



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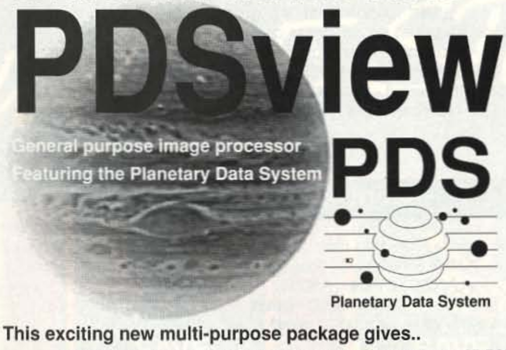

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Whistle-stop tour

Teri Paul whirls around the Acorn PD world

RISC OS 3 has caused a couple of headaches for some A5000 owners and it is good to see people using the PD to alleviate some of the hassles.

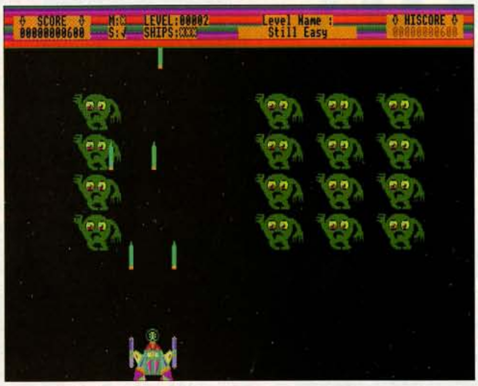
Dook – Drawfile Options Object Killer – comes from 4Mation. It is a utility, originally written by Paul LeBeau, that was used in-house for removing the extra options and settings added by Risc OS 3's Draw which can cause supreme irritation.

The way the drawfiles are adapted causes problems to both Risc OS 2 and 3 users and altruistic 4Mation decided to pop this program into the PD. There is a Help file included which lists some of the problems you may come across – for example Acorn DTP won't accept files with these additions.

Acorn are fixing this problem but to show just the sort of mess you can get into, 4Mation produced a file called Rubbish. Originally 44k and containing one rectangle, the rest of the file consists of Options objects created by dragging a file into itself.

If you remove the excess rectangles, save and repeat the process, one minute later you have a file which is too large to fit on an 800k disc.

This is no problem to people using Draw but if it is used in another application by someone who may not have Risc OS 3 Draw it's a different matter.



Invaders from above

Game, set and match

Some new offerings came courtesy of Paul Hallam, David Law and Graham Green. Paul has created **Not Space Invaders Again** and is a game designed specifically for the Archimedes PD.

Written in Basic, it is a very simple space invaders. You have one ship with dual rockets, and three lives. The invaders are big, bad, green and can fire back. They also move fast. Good fun.

David and Graham have produced **Dungeons of the Beast**. This is a full blown game of 150 levels and costs only £5 directly from the authors: David Law, 24 Woodbourne Road, Brooklands, Sale, Cheshire M33 3SY. They stress that it doesn't use the full capabilities of the Archimedes and indeed it doesn't. The demo version is only 15 levels but is colourful, well programmed and addictive.

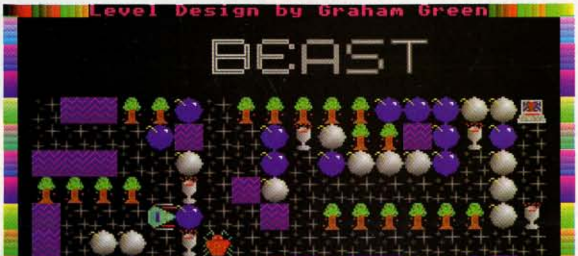
Dungeons of the Beast is a simple game of collecting discs popping them into computers, avoiding spiders, bombs and special pink spheres. Or perhaps you should collect them?

Games players will be well aware of cheats available from PD libraries for a whole host of games. Taking this principle down another avenue is Bruce Goatly's **Inertia Screen Editor**. This allows you to edit 4th Dimension's game screens adding new challenges or making life easier. The program is simple to use and single-tasking.

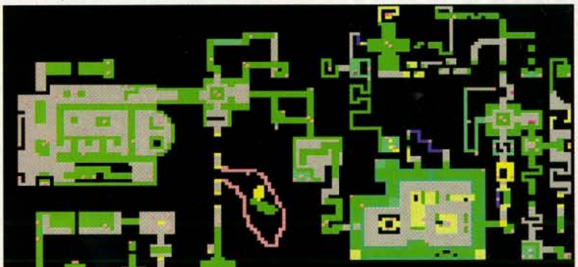
You'll need your original Inertia disc and all the information you need to know is covered in the comprehensive help file. Do read this before you begin. You can make the levels easier or harder, it is up to you.

Displaying a map file takes a some time – they're about 90k long and the program is written in Basic – but the wait isn't too excessive. Most of the screen is taken up by a plan view of the map, with each tile displayed as a two-pixel square. This is rather tiny and the zoom option is welcome.

At the bottom left is a stack of four tiles, one for each of the possible levels where a tile can be placed with the current level highlighted. Above this messages appear, including the coordinates of the pointer. The only two icons are Q for quit and S for save. A small window shows which tile you have chosen to add to the map. When you click on one of the pixels on the map you'll be shown



Beat the beast to the disc ...



... or set your own Inertia challenge

which tile is used – very useful when planning your strategy.

There are 19 tiles to choose from covering all the options available in the original game: Slopes, ice, brakes, vertical speed and so on. Click on the one you want and place it on the screen – the Adjust button will delete. The tiles have been shaded to help with the perspective view of slopes and the bottom of the map wraps around to the top but is displaced one tile sideways. So a tile at coordinates 27,95 is connected to one at 28,0.

That is basically all there is to it, but some useful techniques have been built in. For instance you can force the pointer horizontally or vertically by pressing the H or V keys – useful for drawing straight lines, and you can store the pointer's position on the map by pressing the S key. This lets you use the mouse to change your tile selection and then jump straight back to where you were.

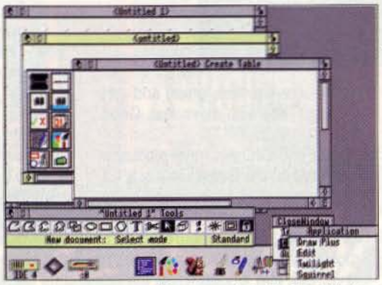
Shut that window

A new application from Stuart Tyrrell has appeared that allows you to close all the windows associated with a particular task – all the Filer windows, all Edit windows or whatever. Called CloseWindows – wow – you can find which applications have windows via the Close option. Clicking on one of these entries will close all the open windows that application has on the desktop.

Some applications will ask for confirmation if you attempt to close windows with un-saved data in them. CloseWindows deals with these in two ways. If the unsaved window is at the top of the stack of windows you will be asked for confirmation in the usual way.

If you can't see all the window or there is more than one CloseWindows leaves all the unsaved windows open. This avoids the confusion when you're asked if you want to save some data, but you've got no idea what it is referring to.

You are free to use the program as much as you wish without registering, but if you want the latest version and other programs, you can register by sending a donation directly to Stuart.



Keeping control with CloseWindows

8-bit lowdown

BBC Micro owners can now indulge in some comic relief with the funny narrator rom. This works best on a Master as the program loads into sideways ram and if you have a Master all you have to do is press the spacebar.

From then on – until you turn the machine off – it will emit different sounds. I think these are supposed to be sampled speech but I couldn't make it out. You get different noises when you load a program, press the wrong key or boot a disc.

There is a host of Tetris clones in the PD world but John O'Rourke's version called Motley-Tris is very good indeed. Two versions are available: One PD and one shareware, both for DFS systems. You can get hold of this via GLM PD or Purple Domain PD while those with access to bulletin boards should contact The Power House BBS on 0895 782676.

Contrived link number 3752 takes us via Tetris' Eastern European origins to I Spy Red, an adventure game set in the USSR – pre-break up, of course. My copy came via JJF PD. The game is set on the other side of the Iron Curtain with your first trick getting out of Red Square.

Real political developments may have disposed of the KGB but secret services have a knack of surviving so you can hone your skills via this tricky and nicely produced offering. Why are all the good adventure games for the BBC Micro?

Sourcing

Products mentioned in this article are credited to the PD library we obtained them from. Other libraries will often have the same programs on their files.

Rave on

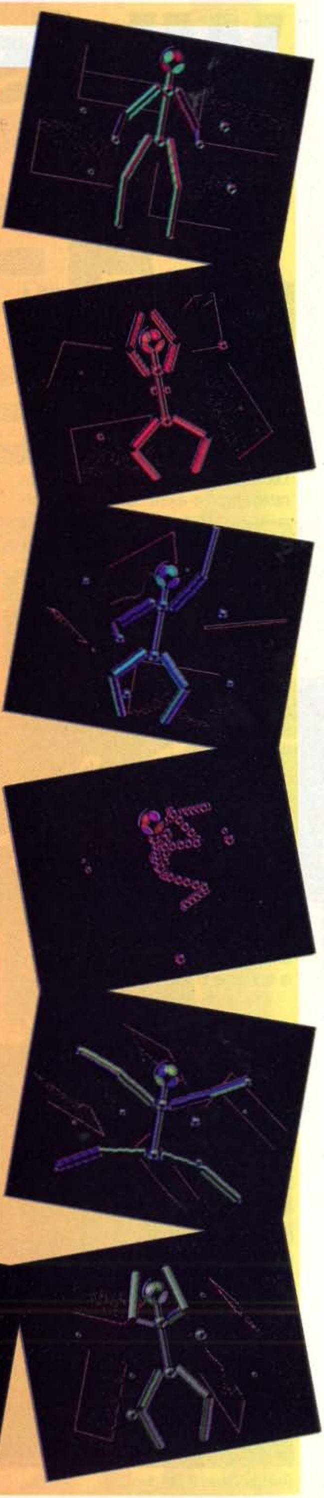
An irate letter from an 8-bit musician has prompted me to emphasise that though the Archimedes Sound Tracker modules are superb, the BBC Micro is not short of its musical offerings too. By the way did you know that the sound chip in the Atari ST is the same one as in the BBC Micro?

Music files do vary in quality and tinniness and some of the samples are very irritating indeed. Here is a list of some of the music I have come across. In particular look out for the music from JJF PD some of which comes with words.

Cotswold are defunct now but you can undoubtedly acquire their tunes from elsewhere.

Rave fans should put down their whistles and load up one excellent 32-bit demo from John Graley called FunkyDemo. It features vector and pre-raytraced graphics, and funky rave music using S/Tracker and 2 Unlimited's Get Ready For This. You can pause or stop as a ray-traced stick man struts his stuff. Get your Archimedes connected to a stereo hi-fi and turn down the lights. If you want more read his ReadMe file and take it seriously.

Music	Library
Nineteen Mix	JJF
Things that make you go Hmmm	JJF
China in your Hand	JJF
Love Changes Everything	JJF
Got to be Certain	JJF
Domino Dancing	Cotswold
Digitized sounds	Welsh Boys
Voyage Voyage	Cotswold
Addicts Anthem	Cotswold
Always on My Mind	Cotswold
It's a sin	Cotswold
Oxegene	Cotswold
Small Town Boy	Cotswold
Maple Rag	Frisky Clams



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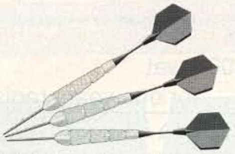

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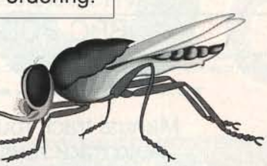
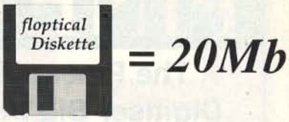


TopicArt5 - Bugs to Slugs

SCSI Floptical Disk Drives



Yes its true!, each 3.5" floptical diskette can hold 20Mb of programs and data etc. Floptical disc drives which are SCSI devices are a wonderful complement to existing SCSI hard disc users or as an alternative to a hard disc solution. Transfer rates are typically 65ms/100k/sec and like standard floppies are competely transportable. Flopticals are also a good media for backing up hard discs. All units are externally housed in an attractive case with power supply and includes one floptical floppy.

A3000/A5000/Archimedes Floptical (without SCSI card)	**£399**
A3000/A5000/Archimedes Floptical (with SCSI card)	**£499**
A5000 Internal Floptical kit (with SCSI card)	**£359**
Floptical floppies (20Mb)	**£20**

Tiler £10+VAT

A printing utility which allows you to print Draw or Sprite files at any size using any printer. The user simply loads the required draw or sprite file into Tiler specifying the size of poster required, using a preset paper size, ie. A2, A0 etc, or as a percentage of the original size or in physical dimensions, ie millimetres. The document will then be increased or decreased in size automatically and printed over several pages with crop marks provided on each page to assist cutting/overlapping.

MegaUtils £10+VAT

A set of genuinely useful RISCOS utilities
!AddrBook An easy to use address book.
!Diary A place to store your birthdays etc.
!CleanUp A hot key util for redrawing windows.
!Disable Prevents you from deleting any file.
!DOSForm A multi-tasking DOS 720k formatter.
!FileMon Displays information about any file.
!LineClock A desktop clock.
!MegaUtils provides a window organiser, key short-cuts to open/close filer windows, set copy and wipe options, set filetypes, quick loading of basic programs, caret flasher, selection of mouse speed, automatic opening of applications, mouse hider, caret grabbing.
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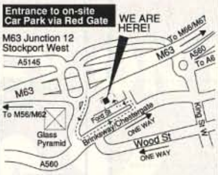

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Acorn User - August 88

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Drawing the line...

Illustrations can make all the difference – Bruce Goatly tells you how

LAST month we saw how you can use different packages to convert text so that it can be treated as graphics in your DTP application, perhaps distorting it too. But what about graphics in the normal sense of pictures and diagrams? Incorporating these with text is part of what DTP is all about.

On the Archimedes there are two types of graphic file: Sprites or Paint files and Draw files. Sprite images are made up of individual dots – pixels – while Draw images are defined mathematically as points, lines and areas.

This means that a sprite looks grainy or jagged when enlarged, whereas a Draw file can be enlarged almost indefinitely without embarrassment. Figure I shows the difference between a sprite – top – and a Draw image – bottom – after enlargement.

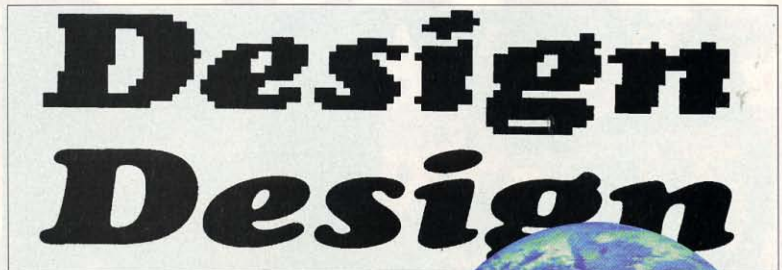


Figure I: Top, the chunky look of sprites, showing that bigger isn't always better. Bottom, the clean look of a Draw object

All true DTP programs can handle both graphic types with ease – just drag the file's icon on to a suitable frame. That's the easy bit, but where can you find suitable graphics?

The most obvious way is to use Paint or Draw to prepare your own, or for that matter any application that can produce sprites or drawfiles. There are very many art packages for painting sprites and it would be invidious to mention only a few. For making Draw files, programs such as DrawPlus – covered in depth in the Essential Archimedes CAD section – Vector from 4Mation and Computer Concepts' new ArtWorks package provide extra facilities for those who need them.

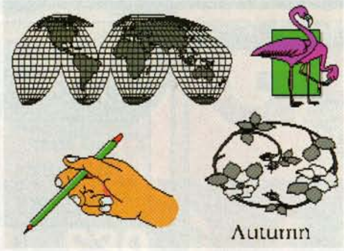


Figure II: A small selection of clip art

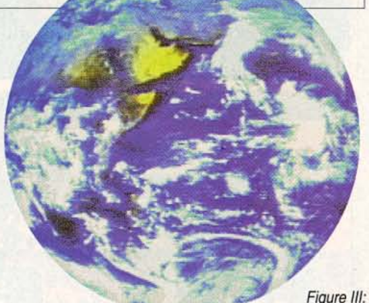


Figure III: A digitised image – note the slightly fuzzy look

Remember that because of the multi-tasking nature of Risc OS, you can save a sprite or drawfile direct to a frame in your document – it is not necessary to go via a disc – as long as both Paint or Draw will fit into the computer's memory at the same time as your DTP application. This saves time and disc space but you'll need at least 2Mb of memory.

Several 3D drawing, ray-tracing and CAD packages can output images in Paint and Draw format. However, there is another way to get hold of graphic images without having to be creative.

Graphic sources

Ready-made graphics, usually called clip art, can be bought quite inexpensively from a wide range of suppliers – just look at the PD adverts in *The Micro User* every month. Most of this type of clip art is in the form of drawfiles, also sometimes called line art – Figure II.

Paint-style clip art is available for computers other than just the Archimedes. If you have some you can convert the files yourself with an application called Translator, which is also obtainable from PD libraries. The only way to convert from Illustrator (Apple Macintosh) and CorelDraw (PC compatibles) is via ArtWorks, when it's available.

Clip art saves you a lot of time and it can often be purchased in defined subject areas, such as maps, cartoons or technology. Its only real disadvantage is that using it too much makes your work look boringly predictable.

Mechanical aids

A sure way of avoiding the repetition of clip art is to have your own independent source of illustrations, and there are a couple of ways of converting artwork from other forms to a computer image. The first is a scanner, which as its name implies scans an image – such as a drawing or photograph – turning it into a sprite which can be stored on disc or transferred directly to the document.

There are several different types of scanner, ranging from the hand-held device with a 105mm scan width and the motorised variety for A4 paper, to the sort that can scan solid objects from overhead. Scanning software and hardware usually let you choose the resolution – sometimes up to 400 dots per inch – which determines the fineness of detail that can be captured. Special books of non-copyright artwork exist, so you can use scanning to provide your own clip art.

For black and white work it's best to get a modern scanner that provides 256 grey levels. Older ones rendered grey levels by a *dithering* process which could cause regular diagonal patterns all over the resulting sprite.

Colour scanners are also available, though more expensive than monochrome ones, and are useful if you have a need for colour printing. If you can't afford a scanner, or only need a few items converted, bureaux are now springing up to do it for you.

Don't waste memory

KEY TIP

If you have to use the same graphic several times in an Impression document you can save memory by only importing it into one frame and flowing it into other frames with Adjust, just like linking text frames. Each view of the graphic can be re-sized independently.

The second source of images is digitisation, which is where a video source such as a TV or video camera picture is converted into a sprite. Digitised pictures (Figure III) often look more lively than scanned ones, though the quality is generally not as good because it is limited by the incoming video quality.

As with scanners, there is a fairly wide variety of digitisers to choose from, both colour and monochrome. Unlike scanners, though, the additional complication arises of whether or not the digitiser can capture frames in real time – if not, you can only digitise non-moving objects.

The problem with sprites, and with colour scans and digitised images in particular, is that they take up a lot of disc space and memory. If you are going to be doing much in this area, you'll need to invest in a large capacity hard disc and probably in some

➤

> *If you're going to be doing a lot of scanning you'll need to invest in a large capacity disc*

Digitised pictures can add a new element to your work

Check out our special reader offer on Bruce Goatly's book *DTP for All*

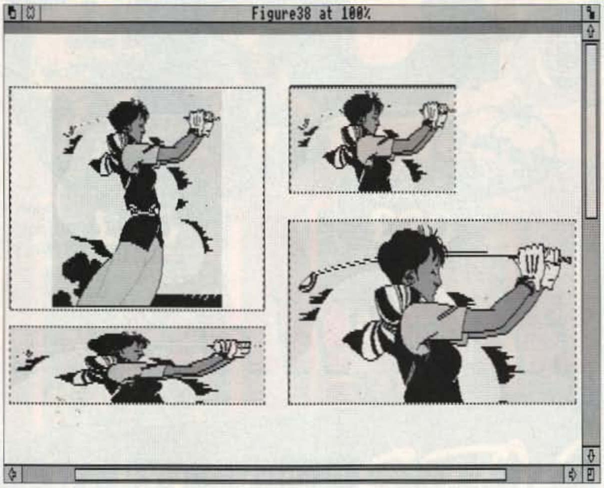
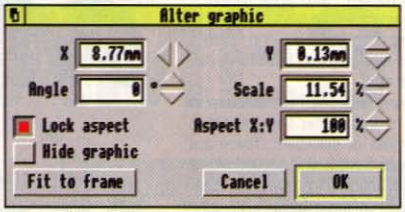


Figure V: Clockwise from top left – original, cropped, resized and stretched graphics



X 8.77mm

Y 8.13mm

Angle 0 °

Scale 11.54 %

☑ Lock aspect

Aspect X:Y 100 %

☐ Hide graphic

Figure IV: Impression's dialogue box for altering a graphic

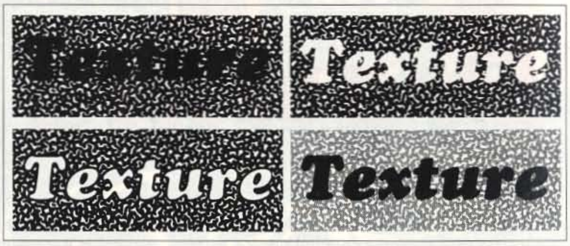


Figure VI: Overlaying text on a graphic background – the bottom two are easier to read

software to help you make the most of the space.

Such software can help in two ways. One way is to compress the sprite files with applications like SparkPlug, ArcFS and Compression, so they take up a lot less space on disc. The second is to convert the sprite to a drawfile taking up less space, though this tracing process works best for certain types of sprite – some drawfiles end up larger than the original sprites.

Suitable conversion software is Tracer from Midnight Graphics, Trace from David Pilling, and Image Outliner from Iota. Once compressed or converted, the graphic can be used in the normal way.

Don't forget that the distortion option using software such as Poster or DrawBender, described last month for text, is in fact available for any drawfile, so you can manipulate converted sprites to your heart's content too.

So now you've got all the graphics you need and have dropped them into their graphic frames. There are several operations you can carry out on imported graphics, some of which aren't suitable for all types of illustration.

First there's cropping, which simply means trimming off parts of a picture you don't need, usually to improve the balance of an illustration or to focus on a particular area.

In Impression you simply use Select to drag the frame borders over the unwanted parts. Next comes resizing, which is adjusting the scale of the graphic inside the frame. There are two ways of doing this in Impression, the simplest being to drag a corner of the frame with Adjust, which is a rough-and-ready method. The more controlled way is to double-click on the frame to call up the *Alter graphic* dialogue box depicted in Figure IV.

As you can see, a good few options are available from this dialogue box, of which Scale concerns us here. You can alter the percentage to make very small and accurate changes to the size. Note that this doesn't change the size of the frame, only the enlargement or reduction factor of the graphic inside it.

Neat framing

If you want to fit a graphic to a specific size, make the frame right first and then click on the *Fit to frame* icon. This will make the graphic as large as possible while still fitting the frame. If the *Lock aspect* icon is selected, the graphic will retain its shape and there will probably be spaces at top and bottom or at the sides.

If you want you can turn this off and the graphic will then be stretched or squeezed to the shape of the frame.

The proportions of a picture can also be changed in a more controlled way with the *Aspect X:Y* writable icon. Unless you have a special reason for doing so it's not a good idea to stretch or squeeze pictures of recognisable objects and especially not of people – you can severely offend them by making them look fat.

There are two more things you can do with graphics in Impression – panning and rotating. Panning is moving a graphic around inside its frame, either by dragging it with Select or by changing the x and y values in the dialogue box. Rotating is done similarly by dragging with adjust or by altering the number in *Angle*.

Note that sprites can't be rotated in Impression unless the *Enhanced graphics* icon is selected in the Preferences dialogue box, which is reached via the Impression icon bar menu. Drawfiles, however, can always be rotated.

If you have a large or heavily illustrated document you can speed up printing and reduce the memory load by turning on the *Hide graphic* option. Just remember to turn it off again before you do your final print run.

Figure V shows the use of a number of the graphic manipulations described – cropping, resizing and changing aspect ratio. Cropping and resizing are often done simultaneously.

A different use for a graphic is illustrated in Figure VI. This shows you must be careful when overlaying text on a graphic background – too strong a background pattern will make the text unreadable.

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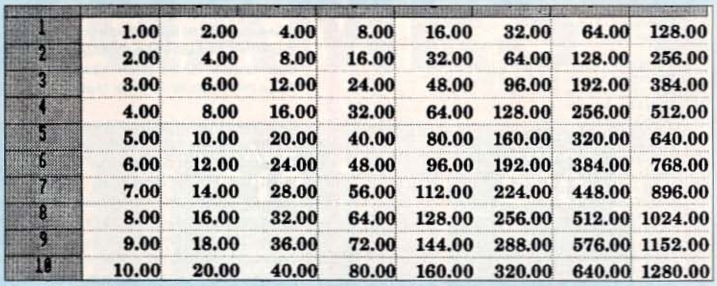
Figure I: Transferring results as text...

```
A1:1   B1:A1*2   C1:B1*2   D1:C1*2   E1:D1*2   F1:E1*2   G1:F1*2   H1:G1*2
A2:2   B2:A2*2   C2:B2*2   D2:C2*2   E2:D2*2   F2:E2*2   G2:F2*2   H2:G2*2
A3:3   B3:A3*2   C3:B3*2   D3:C3*2   E3:D3*2   F3:E3*2   G3:F3*2   H3:G3*2
A4:4   B4:A4*2   C4:B4*2   D4:C4*2   E4:D4*2   F4:E4*2   G4:F4*2   H4:G4*2
A5:5   B5:A5*2   C5:B5*2   D5:C5*2   E5:D5*2   F5:E5*2   G5:F5*2   H5:G5*2
A6:6   B6:A6*2   C6:B6*2   D6:C6*2   E6:D6*2   F6:E6*2   G6:F6*2   H6:G6*2
A7:7   B7:A7*2   C7:B7*2   D7:C7*2   E7:D7*2   F7:E7*2   G7:F7*2   H7:G7*2
A8:8   B8:A8*2   C8:B8*2   D8:C8*2   E8:D8*2   F8:E8*2   G8:F8*2   H8:G8*2
A9:9   B9:A9*2   C9:B9*2   D9:C9*2   E9:D9*2   F9:E9*2   G9:F9*2   H9:G9*2
A10:10 B10:A10*2 C10:B10*2 D10:C10*2 E10:D10*2 F10:E10*2 G10:F10*2 H10:G10*2
```

Figure II: ... or as formulae



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4	4.00	8.00	16.00	32.00	64.00	128.00	256.00	512.00
5	5.00	10.00	20.00	40.00	80.00	160.00	320.00	640.00
6	6.00	12.00	24.00	48.00	96.00	192.00	384.00	768.00
7	7.00	14.00	28.00	56.00	112.00	224.00	448.00	896.00
8	8.00	16.00	32.00	64.00	128.00	256.00	512.00	1024.00
9	9.00	18.00	36.00	72.00	144.00	288.00	576.00	1152.00
10	10.00	20.00	40.00	80.00	160.00	320.00	640.00	1280.00

Figure III: Font information is retained when outputting as a drawfile

Spreading

CONNECTIVITY describes the ability of a particular application to import and export files from or to another. Applications on their own can be very useful but eventually you will want to exchange information that you have created.

This is such an important area that you should check a program's capabilities before going too far down the road of using it only to find that the information you have created cannot be moved across into other packages.

Having used a spreadsheet for creating documents the next item you should then look for is a package's ability to use the information that you have created elsewhere.

For example, if you were creating the treasurer's report for the AGM of a small society, a financial report for a company or just writing a report on some device testing, this would be in the form of a document in which certain spreadsheets would be required.

They would be needed to show how the information was arrived at and to help the readers understand the conclusions reached.

Each application you use has a particular format in which it stores its information. In Acorn parlance this is known as the filetype. If you looked at the way a Schema file is stored you would see that it contains an enormous amount of data in a particular sequence which is totally different to that of any other application.

File formats

If you have a copy of Schema, or any other spreadsheet program, try dropping one of its files into Edit and you'll see what I mean.

It would be very difficult for some other application to understand all the different spreadsheet file formats that exist.

So we use common data file formats which allow files to cross over between different applications. The three most common ways within the Acorn environment are sprite, draw and text file formats.

Sprites are bit-mapped pictures which cannot be magnified without getting a grainy look and each colour point is a separate item.

But you can get good representations of real-world objects in the form of scanned images and video grabs.

Draw files are used for line drawings where the information is stored in such a way that their size can be changed easily without getting jagged edges. Each line or shape is stored as a separate object. Textual information can be transferred using the standard Edit files as shown in Figure I.

For a spreadsheet application it is therefore important that it can create Draw and Edit files which can then be used by other compatible applications.

The original text for this article has been input via Edit and as Schema can output a spreadsheet as text I am able to save the whole, or part of a spreadsheet, directly into my Edit file.

From earlier articles you will also have appreciated that you can output, in Edit file format, the contents of each cell expressed as the formula that each cell contains rather than the result. Figure II shows it.

If you were using a more sophisticated document processing package such as Impression or EasiWriter you would also be able to drop this text file into a document. However, you'll notice that the Edit filetype does not contain information about the graphics or fonts being used.

Figure III is a drawfile saved from Schema of the spreadsheet shown above. Note that cells contain text in Newhall font in the drawfile while in the Edit file they are only in the System font. Many, if not all, of the document processing packages have the ability to import drawfiles. Another option available in Schema is to save a file as a CSV filetype, see Figure IV.

Between each cell in a particular row a comma is inserted – called a field separator – and between each column there is a carriage return/line feed – referred to as a record separator. You can now see the earlier spreadsheet as a CSV file:

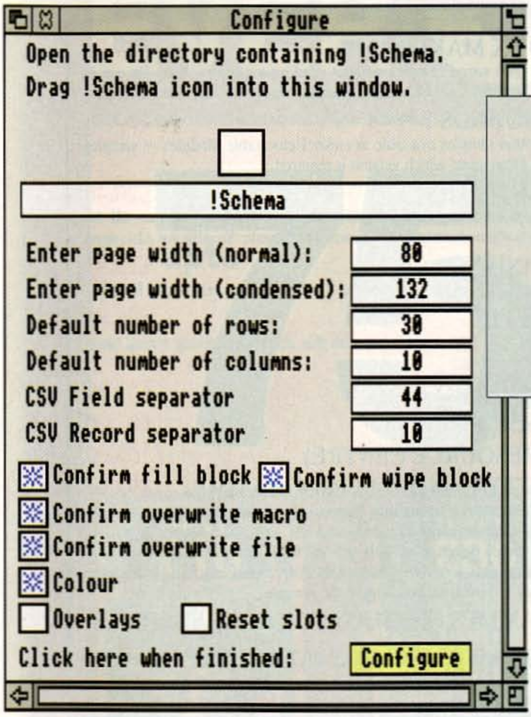
```
1,2,4,8,16,32,64,128
2,4,8,16,32,64,128,256
3,6,12,24,48,96,192,384
4,8,16,32,64,128,256,512
5,10,20,40,80,160,320,640
6,12,24,48,96,192,384,768
7,14,28,56,112,224,448,896
8,16,32,64,128,256,512,1024
9,18,36,72,144,288,576,1152
10,20,40,80,160,320,640,1280
```

With certain applications such as EasiWriter and TechWriter you can drop these CSV files into a document and they automatically create a table of the data.

For those with an interest in CSV file format you should be aware that currently the National Council for Educational Technology is defining an enhanced CSV file format called SID.

The main differences are that information about the file such as origin, date and so on can also be

Barry Mallett connects your spreadsheet to the world at large



Configure

Open the directory containing !Schema.
Drag !Schema icon into this window.

!Schema

Enter page width (normal): 80
Enter page width (condensed): 132
Default number of rows: 30
Default number of columns: 10
CSV Field separator 44
CSV Record separator 10

☒ Confirm fill block ☒ Confirm wipe block
☒ Confirm overwrite macro
☒ Confirm overwrite file
☒ Colour
☐ Overlays ☐ Reset slots

Click here when finished: Configure

Figure IV: You can alter the type of CSV file produced

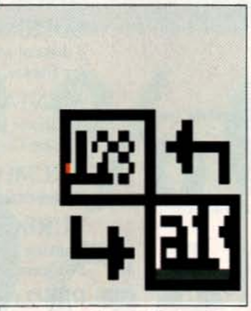


Figure V: The icon for the Lotus 1-2-3 translator

the word

contained within the file – items beginning with %%xxx. These items are then considered not as part of the data field but as header information.

Separators

If you access the Schema Configure application you'll see options for the record and field separators. Some applications, for example do not use the comma for separating records but use the Tab character. You can set up these options as you configure Schema.

With Schema there are basically two techniques for inputting data – via CSV and Edit files. CSV files can be input to a Schema spreadsheet as well as output.

This can be very useful when you have some form of instrument which reads a set of probes at regular intervals and creates a file of the results. Alternatively you can use an Edit file to create a file of values which you can then insert into Schema. In this case you will have to change the file format from Text to CSV. On Risc OS 3 you can access the Edit menu:

```
Misc-Set type-CSV
```

or via Risc OS 2 from the command line:

```
*settype adfs::hard1.$.Schema264.file csv
```

For those of you who are familiar with the PC standard Lotus 1-2-3, Schema has the capability of importing and exporting 1-2-3 files.

Although I would not recommend this as a method for using Schema permanently it is a method by which you can work on Lotus 1-2-3 files at home should you use it at work, for example. There is a separate application is supplied with the Schema disc for this very purpose it's icon is shown in Figure V.

Schema's use of macros is one of its most powerful elements. Its small edit window has its own menu structure and the first item is Save – File. The writing of macros is something we will come on to later but you can create macros in Edit and import and export them to and from Schema.

The following macro is one that can be used for creating simple project plans. You specify the start date and the number of weeks you require. Schema then creates three rows of information containing the week numbers and the working dates of those weeks plus an extra title of the months.

```
macro heading (t(),s,n)
local j, k
local month(11)

month(0) = "Jan"
month(1) = "Feb"
month(2) = "Mar"
month(3) = "Apr"
month(4) = "May"
month(5) = "Jun"
month(6) = "Jul"
month(7) = "Aug"
month(8) = "Sep"
month(9) = "Oct"
month(10) ="Nov"
month(11) ="Dec"

t(0,0) = "Month"
t(1,0) = "Days"
t(2,0) = "Week No"
for k = 1 to n
   t(0,k) = month( months(s)-1)
   t(2,k) = " " cat k
   t(1,k) = days(s) cat "-" cat days(s + 4 * 24 * 3600)
   s = s + 7 * 24 * 3600
next k
=k
endmacro
```

To use this particular macro enter it in Schema's Edit window or an Edit file that you can then drop into the Edit window. You then need to enter into a cell, say A1, the following call for this macro:

```
heading (B2><J4, TTIME(1990,2,19,0,0,0),8)
```

where:

heading	The macro call
(B2><J4,	Where the information is to be displayed in the spreadsheet.
TTIME	The call to a !Schema function for calculating the temporal equivalent of the given date and time.
(1990,2,19,0,0,0)	Year 1990, Month 2 (FEB), Date (19th), Hours, Minutes and Seconds.
,8)	Number of weeks to be displayed.

The information should then be calculated and displayed in your spreadsheet. The result is shown in Figure VI.

● ***Next month we'll take a more detailed look at macro creation and use.***

```
|      |   A    |   B    |   C    |   D    |   E    |   F    |   G    |   H    |   I    |   J    |
|======|========|========|========|========|========|========|========|========|========|========|
|    2 |        |Month   |Feb     |Feb     |Mar     |Mar     |Mar     |Mar     ||Apr    |Apr     |
|    3 |        |Days    |19-23   |26-2    |5-9     |12-16   |19-23   |26-30   ||2-6    |9-13    |
|    4 |        |Week No | 1      | 2      | 3      | 4      | 5      | 6      | 7      | 8      |
```

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Steve Bruntlett continues with his packaging design tutorial

It's a pizza cake

HAVING looked at basic box construction in the last article I thought we'd develop those ideas into a fully-blown packaging design. I'd like to add a few observations on designing boxes to what we covered last month.

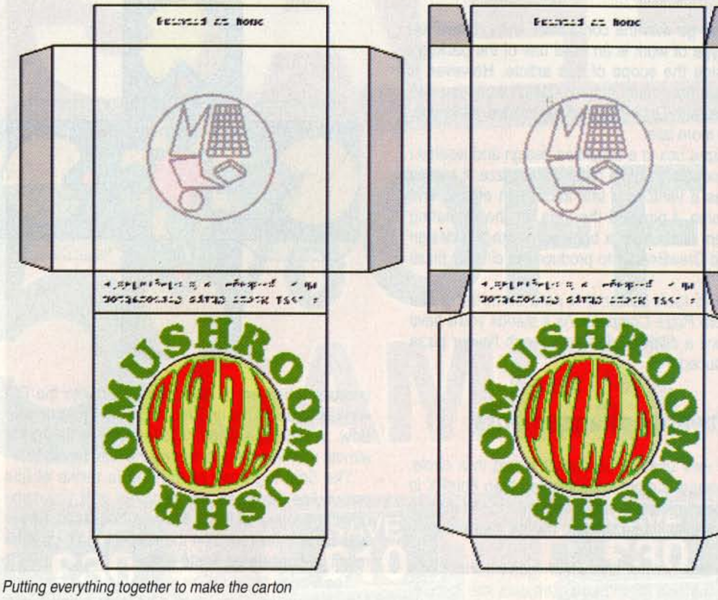
Tabs are required for the construction of most packages but their positioning depends on the required strength of the box, its method of construction and its storage before use.

A box with glued tabs along the four vertical edges leaves only the top flap as an opening. This is stronger but the box isn't storable in a ready-to-use state. Once the vertical flaps have been glued it can't be flattened again.

A box with a single glued flap, making a tubular structure, has a tuck-in top and bottom that is weaker but can be stored in a glued but flat state. In any box if you cut a small slot in the tuck-in flap at either end along the fold, you'll find that if it's slightly curved it will stay in place when tucked into the box.

Using commercial ideas

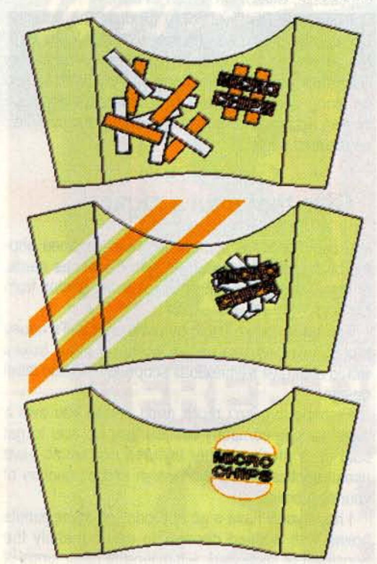
Take a chip container. This isn't a usual box format but is relatively simple to construct. Use a large grid lock setting and draw the container elements as closed outline shapes using straight lines and try to get the proportions correct in the process.



Putting everything together to make the carton

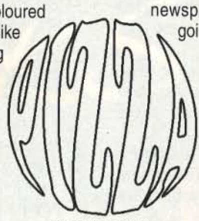
As soon as you're happy with the overall arrangement of shapes, change those straight lines which need to be curved using the Edit menu. Once all the shapes are reasonably correct they can be grouped to be treated as a single unit when required.

Such a container needs information, decoration and a logo. I decided on some simple coloured stripes for the decoration but felt that I'd like to experiment with a logo before finalising the design. I also came up with a litter symbol and a message to indicate who'd produced it and information about the package's environmental implications.



Variations on the chip container

The problem with overlaying decoration on to a drawn outline is that part of the outline disappears. To get round this I produced a copy of the container outline, changed the fill colour to *None*, which makes it transparent, and overlaid this on top of the stripes to reinstate the outline. Most packages don't have black outlines round the edges but they're very useful when cutting out and folding.



Pizza logo from DrawBender

Chip off the block

The original idea for the chip container's logo was to use chip-shaped blocks with text inside but I settled for simple rectangles, producing the text for the logo in a bold sans serif font, thickening the outline and changing the fill colour after changing the text to graphic objects. These lines of text were then scaled to fit inside the rectangles.

I tried two variations with the text rectangles and some blank rectangles to look like stylised chips. The formal arrangement looks like a plus sign with two blank chips being used underneath. The more informal pile of chips was produced by copying the blank chips, rotating them and arranging them so that they looked reasonable. I thought of scanning a newspaper for the background but that was going a bit far.

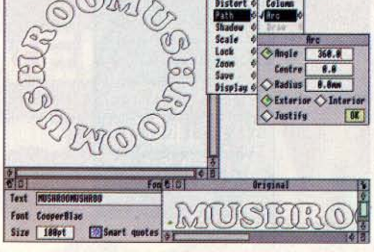
To give more variety to the range of logos I decided to produce a sesame bun-shaped logo with the text in the middle – a sort of micro chip buttie. After playing around with various arrangements of chips, logos and decorative stripes as well as colour schemes I settled on the final version.

If you're faced with recolouring lots of little bits in a complex drawing use a program like Chameleon to make it easier.

I produced a litter symbol using lines, closed shapes and ellipses, making all the lines the same thickness and colour, and grouping it for scaling and positioning on the reverse of the chip container.

The other part of the design brief was to produce

➤



Angle 360.0
Centre 0.0
Radius 0.0mm
Text MUSHROOMUSHROO
Font CooperBlac
Size 100pt
☑ Smart quotes

Using Fontasy to make the carton

> The more informal pile of chips was produced by rotating and arranging them

a menu to go with the containers. Using DrawPlus for this type of work is an ideal use of the package but outside the scope of this article. However, it does show how much graphic design work you can undertake with DrawPlus and associated packages, of which more later.

The pizza box is a simplified design and wouldn't be big enough to hold a normal size pizza. It serves simply as a vehicle to talk about text effects and logo design. I pinched the idea for the repeating mushroom circle from a book on packaging design and used DrawBender to produce the circular pizza symbol.

It would look better if it said something like *Mushroom Pizza Company*. As it stands you'd have to produce a different design for each flavour pizza you produced.

Software enhancements

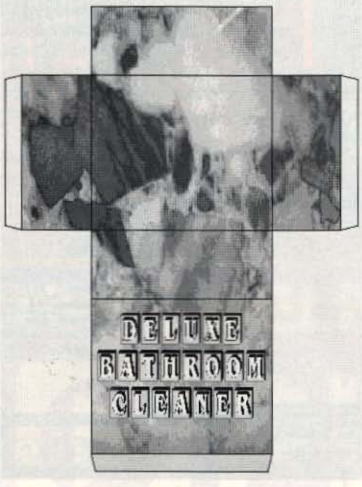
Fontasy was used to produce the text in a circle. This package is more sophisticated than FontFX in the range of effects it offers and also in the degree of control over those effects, but it's more expensive.

Using the control line which goes horizontally through the line of text being treated, the circular text can be moved towards or away from the circle it's being drawn around. This gives fine control over the gaps between letters which isn't possible with FontFX.

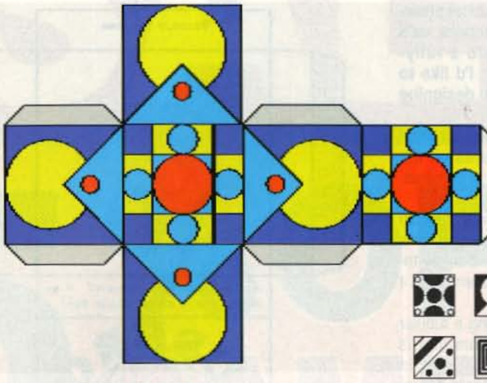
The box itself is of straightforward construction but look at a real pizza box to find put how much more sophisticated they are in terms of flaps and folding structure. Real pizza boxes are constructed from laminated board to be strong, usable and heat proof.

Your design could be spray-mounted on to laminated board for increased realism but you may have to pay attention to the folding mechanism due to the increased thickness.

Producing text distorted into a circle is simply a matter of dropping an outline drawn circle into the Skeleton window of DrawBender, dropping the grouped, changed to path, line of text into the Full window and clicking on Process in the Skeleton window. Watching the calculation of the design is almost as interesting as seeing the final result.



Marble texture box and TypeStudio lettering



Cube box using decorative panels

The final logo can be treated in terms of line colour, line thickness and fill colour until you come up with a logo that looks the part. You could always add some mushrooms in the corners to fill up what might be considered waste space.

The design looks OK as a logo but it's a bit crude for a full box lid. Something a bit more mouthwatering is desirable but you'd probably want to include the logo in the layout to identify the product with the company. Again, have a look at some of the pizza boxes currently in use, preferably in situ. Who says research isn't rewarding.

If the idea of packaging design is neither relevant nor of interest try producing some basic boxes for presents or for storing everyday items.

Back to basics

The basic cube shape box uses some of the decorative panels which, along with a range of outline and draw fonts on a supplementary disc, come with an excellent little publication called *The Font Book*.

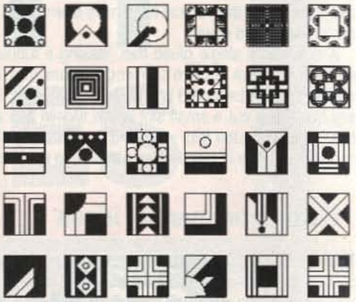
Anyone who's at all serious about the use of fonts in their work should have a copy of this mine of information. It also shows what's possible using simple geometric and text effects. Such boxes can be kept in monochrome or produced in colour if you have access to a colour printer.

One of the nice things about DrawPlus is that in addition to producing some really good quality work with basic shapes and text, you can also combine other sources of graphic imagery to give a different graphic effect. Line Art can be imported into DrawPlus in the usual way to be treated as part of the drawing.

Clip Art is usually in the form of sprites that are handled in a more limited way. They can be scaled in DrawPlus but can't be rotated, so any change in angle has to be handled in a paint package before dropping them into a drawing.

That's not a problem if you use a Risc OS paint package as you can work with that and DrawPlus on the desktop simultaneously making fine adjustments until you're happy with the result. If you're worried about rotating sprites and losing detail use a mode such as 13 or 21 which have square pixels.

The kind of sprite especially useful in this kind of design work is a block of simulated texture such as wood, foil, brick or marble. If you have access to a scanner you might like to produce your own textures.



Patterns from The Font Book supplementary disc

The examples I've used came from Clares as part of their Illusionist package. You may need to look at existing packaging to find appropriate examples of the use of such textures as it's all too easy to produce something gimmicky – like I did.

The text on the box lid was produced using TypeStudio that has facilities for producing text effects easily and quickly. It also produces a range of effects that would be very difficult, if not totally impossible, with DrawPlus on its own.

I used the Plinth effect to produce the lettering blocks for the box. As you may expect it looks terrible on screen but quite sharp when printed. This illustrates the necessity to print out the work as you go along rather than making visual judgements on screen appearance alone and being disappointed on the final printout.

Give that man a cigar

You could produce photocubes from scanned photos of the family to send out with Christmas cards, or highly decorated scenic boxes using photos from holidays.

The brick texture could be used on a doll's house box. The wood texture on imitation cigar boxes would also give tremendous scope for intricate label design.

Perhaps this isn't much good unless you own a cigar packing company but you may be able to get hold of or produce other textures that would have useful applications in the design and production of your own boxes.

I hope you'll have a go at producing some simple boxes with applied decoration and hopefully the principles of such work will extend to other kinds of graphic design work.

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See Pages 3, 5, 6, 8, 10, 13

LANGUAGES (Archimedes)

ISO-PASCAL; FORTRAN 77			£77 each
Assembler; LISP; Prolog X			£149 each
ANSI C Rel. 3	£125	Logotron Logo	£45
Macro Assembler	£40	Risc Basic	£120
Robo Logo	£69	Risc FORTH	£110
BASIC Compiler	£77		

NEW 256 Grey-Scale Scanner

Watford proudly introduces its new innovative 256 grey-level hand scanner for the Archimedes range of micros. It offers up to 400 dpi scanning resolution, complete with software.

256 Grey-Scale Scanner is ideal for incorporating pre-drawn logos, artwork, photographs and sketches into desktop publishing documents and other graphics programs. Designed by our own R & D team, it offers the best overall scanning solution for Archimedes micro. Just compare the competition on our price and these outstanding features:

- Full 105mm 400dpi scanning operation in just 3mS per line! (Twice as fast as most scanners.)
- Selectable 256/16 grey levels
- Full scan preview, scale to fit windows
- Complete set of image enhancement tools
- Single width podule
- True brightness and contrast control
- Fast RISC OS printing
- Over 1000 Image processing options; smoothing, enhancement, edge deletion, convolution, etc.
- Full Interface to ChangeFSI

Special Launch Price
£185

ULTIMUM – Archimedes A3000 Podule Racking System

THE ONLY LOGICAL WAY TO EXPAND YOUR A3000 COMPUTER

Price: £149

Minerva's Archimedes Software

EasyWord	£18	Mailshot*	£27
Home Accounts	£35	Reporter*	£27
Time Tabler	£549	School Admin*	£65
System Delta	£59		

System Delta Program Reference Manual £29
** Requires System Delta to operate*

Stand alone Business Accounts Packages
Sales; Purchase; Order Processing and Invoicing; Nominal; Stock management
£79 per module
or Complete Business Package **£325**

ARM 3 Turbo Card

Simply The Best

Here it is at last – the all new Mark 2 version of Watford's highly acclaimed ARM 3 processor board for the Archimedes and now also the A3000 series computers. Using the latest surface mount technology on a high quality four layer circuit board we have reduced the overall size to a mere 53mm x 45mm, and the cost to only £199. Mk II upgrade will increase the speed of your micro by a factor of 3 to 6.
Any competent A300 or A400/1 series micro owner can fit the upgrade himself, as we provide full fitting instructions and a special ARM chip extraction tool. However for A3000 micros and those not wishing to perform the upgrade themselves, we will collect, upgrade and return your micro by courier service, at an additional cost of £18.
(A300 and old A440 series owners please note – you will need to upgrade to MEMC1A for ARM3 to work.)

RRP £249

Offer Price £169

Acorn have satisfactorily evaluated Watford's ARM 3 upgrade and the A3000 upgrades are fitted by Acorn approved surface mount technology centre, therefore its fitment will not invalidate Acorn's warranty on the micro.

Continued→ → → → → → → → →

BBC MASTER

MASTER 128K Micro incl. Acorn's View, Viewsheet, ADFS, BASIC Editor & TERMINAL plus FREE OFFER (see below) **£399**

FREE OFFER

A 5.25" Double Sided, 40/80 track switchable 400K Disc Drive complete with cables and a Utilities disc incl. 2 games, plus

Gemini's OFFICE MATE & OFFICE MASTER packages on Disc consisting of: Database, Spreadsheet, Beebplot graphics. Accounts packs: Cashbook, Final Accounts, Mailist, Easyledger, Invoice & Statements, Stock Control.

FREE with every BBC Master purchased from us during May

Add-Ons & Accessories

Econet Module for the Master	£42
Twin ROM Cartridge for Master	£9
Quad ROM Cartridge for Master	£14
Master Reference Manual I	(No VAT) £14
Master Reference Manual II	(No VAT) £14
Master Advance Ref Manual	(No VAT) £17
64K Upgrade Kit for B+	£32
Acorn 1772 DFS Kit complete	£49
ECONET Upgrade Kit for BBC B	£42
ALL ECONET UPGRADES Available	
ARIES' IEEE Interface for BBC B & Master	£238
Morley Teletext Adaptor with ATS Rom	£99
Ecolink	£270

Z88 Portable Micro

£179

FREE

With every Z88 purchased from us, we are giving away absolutely FREE, a Z88 to BBC Interface Link, 4 rechargeable batteries and a compact Mains Battery Charger worth £38.

Z88 ACCESSORIES

• 32K RAM Pack or 32K EPROM Pack			£16
• 128K RAM Pack or 128K EPROM Pack			£32
• 512K RAM Pack			£86
• 256K Eprom Pack			£55
• Z88 Eprom Eraser Unit			£38
• Z88 Carrying Case			£8
• Z88 Computing Book			£9.95
• AA Nicad Rechargeable Battery			£1.50
• Battery Charger Compact & Fast			£6
• Z88 Serial Printer Cable			£8
• Z88 Parallel Printer Cable			£18
• Z88 to Archi Link			£15
• Z88 to BBC Link	£8	• Z BASE	£56
• Z88 to PC Link II	£27	• Z TAPE	£42
• Z88 to Macintosh	£32	• Z TERM	£42
• Z88 Mains Adaptor	£9	• Z88 Modem	£114

Archi Real-Time Digitiser

Now supplied with NEW RISC OS Version Software

Watfords' Archimedes Video Digitiser is the most sophisticated digitiser ever designed for a micro. It provides a fast and flexible means of capturing images from a video camera or recorder for display and manipulation on the Archimedes range of Micros. Off-air televison signals may also be digitised via a video recorder or TV tuner. Please write for further details.

Price £119

A Set of Colour Filters for colour image grabbing using a video camera **£16**

Archi Graphic Tablet

The Archi Graphic Tablet offers performance and accuracy comparable to other tablets priced at well over £400, and has the useful addition of a liftable cover, which can hold tracing material or menu templates securely. The package is supplied complete with sophisticated Archi software. (Now, fully LinCAD compatible. Recommended by Linear Graphic for use in Education).

(FREE this month, PC Mouse Drivers & Art package)

Special Price £165

(Price includes Tablet, Leads, Software & Puck)
Stylus Optional Extra **£15**

Archi Graphic Tablet Junior. Working area 9" x 6". Price includes Stylus **£110**

Disc Plonker Rack

When using ones micro, there is a tendency to have more than one Disc on the desk. This exposes them to the hazards of fingerprints, scratches, dust, coffee and an untidy desk. Why not protect your valuable data from all these hazards with the help of our extremely handy and low cost DISC PLONKER RACK. Holds up to eight 5.25" discs.

Protection at Only: **£2**

Special Bulk Offer Discs

(Supplied packed in Anti-Static Lockable Storage Units)
(Lifetime warranty on Discs)

BULK PACK DISCS in lots of 100

Type	S/S 40T	D/S 40T	D/S 80T
• Without Sleeves 5.25"	£28	£33	£38
• With Sleeves 5.25"	£31	£36	£41
• 3.5" D/S D/D	£27 for 50		£49 for 100

Acorn & Watford DFSs

• Watford sophisticated DFS ROM	£16.00
• Watford DFS Kit complete	£69.00
• We will exchange your existing ROM for Watford's ultimate DFS ROM at only	£12.00
• DFS Manual (comprehensive)	£6.95
• Acorn DNFS ROM	£17.00
• Acorn ADFS ROM only	£25.00
• Acorn 1772 DFS ROM Kit	£49.00

(The single Density DFS system is now old technology. Like Acorn, Watford too have replaced it with their more up-to-date 1772 DDFS Interface. We have informed most of the software houses of this decision in order that they can ensure compatibility with our highly sophisticated and fully Acorn compatible DDFS).

Watford's MkII 1772

Single/Double Density DFS

Many of our customers have wanted to use our superior DDFS and Acorn ADFS together. Now our Mk II DDFS Board with its 1772 Disc Controller, has been adapted to allow the use of Acorn ADFS as well. It also has all the commands of the Acorn's 1772 DFS, plus the added features as follows:

- Acorn ADFS compatible – Use ADFS on our DDFS board.
- Auto 40-80 Track sensing – no need to fuss with 40/80 track switches.
- An extremely powerful 8271 emulation – ensuring compatibility with almost all software.
- New low profile – small footprint board.
- Option to double the speed of file handling operations – BPUT and BGET.
- Operates in both single and double density modes.

• SPECIAL PRICE	**£44.00**
• DDFS Manual	(No VAT) **£6.95**
• We will exchange your existing DFS Kit for our sophisticated DDFS for only	**£30.00**

3M – Diskettes

3M – SCOTCH Diskettes with Lifetime warranty from Watford Electonics your 3M Appointed Distributor

• *10 x 5.25" S/S D/D 40T (744)*	*£5*
• *10 x 5.25" D/S D/D 40T (745)*	*£5*
• *10 x 5.25" S/S D/D 80 Track (746)*	*£7*
• *10 x 5.25" D/S D/D 80 Track (747)*	*£7*
• *10 x 5.25" 1.6M D/S D/D High Density for IBM XT and AT*	*£9*
• *10 x 3.5" S/S D/D 40/80 Track*	*£7*
• *10 x 3.5" D/S D/D 40/80 Track*	*£7*
• *10 x 3.5" Double Sided High Density*	*£13*

Top Quality 3.5" & 5.25" Diskettes

To complement our range of Quality Discs and Disc Drives. WE are now supplying SPECIAL OFFER packs of 10 Lifetime guaranteed discs. Each disc has a reinforced hub ring. Supplied complete with selfstick labels and a Plastic Library Disc Box.

• *10 x **M3** 3.5" D/S D/D 80 Track*	*£7*
• *10 x **M9** 3.5" D/S High Density*	*£12*
• *10 x **M4** 5.25" S/S D/D 40 Track*	*£5*
• *10 x **M5** 5.25" D/S D/D 40 Track*	*£5*
• *10 x **M7** 5.25" D/S D/D 80 Track*	*£7*
• *10 x **M8** 5.25" D/S H/D Hi-Density*	*£9*
• ***M2** 3" Double Sided*	***£2.50** each*

Quality Disc Drives from Watford

All our Disc Drives are Double Sided and will operate in both Single and Double Density modes. All 5.25" Disc Drives are 40/80 track switchable. For ease of use, the switches are front mounted.

Various UK "manufacturers" of disc drives for the BBC Micro (more accurately, "packagers" label other manufacturers drives with their own name). We buy the high quality NEC and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.

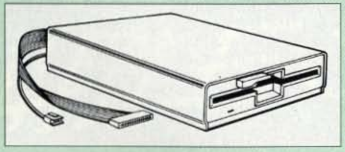
If you look around the popular BBC Micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.

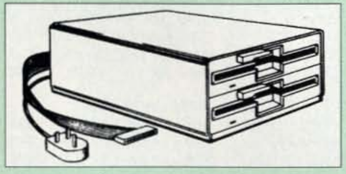
Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate (extensive tests within our workshops have confirmed this). All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. ***Ideal for Schools & Colleges.***

When using a BBC Micro, most people find themselves short of desk space. The Watford's BBC Micro plinths form an ideal way of recovering some of this precious space. Your BBC Disc Drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. With the Watford Double Plinth, your Disc Drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen, paper, reference manuals, etc. Follow the trend with a Watford plinth. (Turn to the 6th page of our advert for the Plinths).

P.S. All our 5.25" Disc Drives with PSU are compatible with the Compact Micro. All you require is our special Compact Disc Drive cables designed by us.

"Test Bureau Approved for Use in Education"





Our Disc Drives conform to BS415

Type	Description	
	Disc Drive without PSU	
• CLS400S:	Single, 40/80 track 400K Double sided Drive	£70
• CLD800S:	Twin, 40/80 track, 800K Double sided Drives	£138
	Disc Drive with PSU	
• CS400S:	Single, 40/80 track, 400K Double sided Drive	£80
• CD800S:	Twin, 40/80 track, 800K Double sided Drives	£153

Special Cable to connect both 3.5" and 5.25" Disc Drives simultaneously to the BBC Compact £13

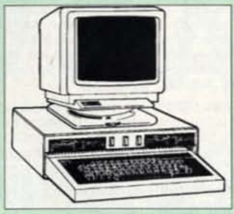
3.5" Disc Drive

These top quality 3.5" Double sided, 80 track, are attractively finished in BBC beige. They are supplied complete with all cables and a Utilities Disc.

Type	Description	
	Disc Drive without PSU	
• CLS35:	Single Disc Drive, 400K	£59
• CLD35:	Twin Disc Drives, 800K	£109
	Disc Drive with PSU	
• CS35:	Single Disc Drive, 400K	£82
• CD35:	Twin Disc Drives, 800K	£126

(P.S. CS35 is supplied in a twin case with a blanking plate to enable easy expansion to a dual drive at a later stage)

Disc Drives in Monitor Stand



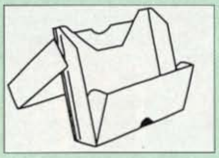
• CDPM 800S – Twin 5.25", 800K Double sided 40-80 track switchable disc drives mounted in an attractively finished Beige colour plinth for the BBC B & Master 128K micros. Supplied complete with integral power supply, cables and Utilities disc. The mains switch with neon On/Off light indicator, and the two 40/80 track switches are mounted on the front panel for ease of use.

£165

• DP35 800 – Same as above except, one disc drive is a 5.25" and the other is 3.5".

£154

Plastic Library Cases



DLC1 –	Holds 5 x 3.5" Discs.	£1.50
DLC2 –	Holds 10 x 3.5" Discs.	£1.90
DLC3 –	Holds 5 x 5.25" Discs.	£1.60
DLC4 –	Holds 10 x 5.25" Discs.	£2.00

Disc Albums

Attractively finished in leather-look PVC Vinyl

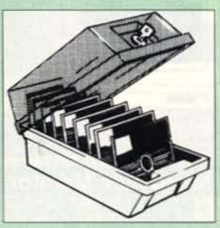
DW1 –	Holds 6 x 3.5" Discs	£2.50
DW2 –	Holds 6 x 5.25" Discs	£3.00
DW3 –	Holds 20 x 5.25" Discs	£3.50
DW4 –	Holds 40 x 3.5" Discs or 5.25" Discs	£4.50

Floppy Head Cleaner Kit

The heads in floppy drives are precision made and very sensitive to dirt. The use of Cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. it is very simple to use. Available in 3.5" & 5.25", please specify.

Price £4

Antistatic Lockable Disc Storage Units



Gives double protection – Strong plastic case that affords real protection to your discs.

Antistatic helps avoid data corruption whilst in storage. The smoked top locks down.

Dividers and adhesive title strips are supplied for efficient filing of discs.

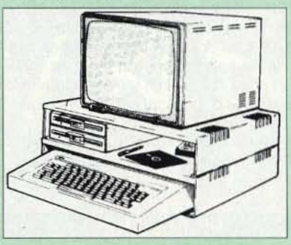
• **M35**	– holds up to 50 5.25" discs	£4.95
• **M85**	– holds up to 95 5.25" discs	£6.95
• **M25***	– holds up to 25 3.5" discs	£4.95
• **M50**	– holds 50 3.5" discs	£6.50
• **M100**	– holds 100 3.5" discs	£6.99
• **M10**	– holds 8 of No. 10 Data Cartridges	£15

* Not lockable

Dust Covers (For our Disc Drives)

Single CLS (without PSU)	£3.20
Single CS (with PSU)	£3.25
Twin CLD (without PSU)	£3.85
Twin CD (with PSU)	£3.90

Plinths for the BBC B, BBC Master & A3000



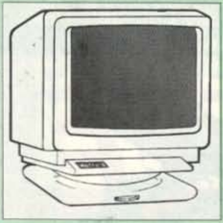
Protect your computer from the heat of your VDU. Our micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and VDU, whilst the double height version provides enough room for our stacked disc drive and other peripherals like, Eprom programmer, music unit or simply discs & stationery. The computer slides neatly in the lower section allowing easy access to remove the lid. Colour: Matching BBC Beige.

Single BBC Plinth	420 x 310 x 105mm	£13
Double BBC Plinth	420 x 310 x 210mm	£24
Single Master Plinth	490 x 310 x 105mm	£14
Double Master Plinth	490 x 310 x 210mm	£26

A3000 Single Plinth (very sturdy & precision made), has a slot on the left for the switch & cut out on the right for 3.5" Disc Drive **£13**

CREDIT CARD 24 HOUR
Ansaphone Hot Lines
(0923) 250234 or 233383

Continued→ → → → → → → → →



FREE
Monitor lead.
Please specify
type required
when ordering
your monitor.

Microvitec Monitors

• **1431** – Standard Resolution Monitor	£169
• **1451** – Medium Resolution Monitor	£209
• **Cub3000** Medium Res for A3000	£189
• **1441** – High Resolution Monitor	£359
• Dust Cover for Microvitecs	£5.50
• **Touchtec 501 Touch Screen**	£239

Now 3 years Parts & Labour warranty on all Microvitec Monitors

Multiscan Colour

• Eizo 9060S	£389	• NEC 6FG	£1525
• Eizo 9070S	£579	• Taxan 770LR	£362
• NEC 3FG	£370	• Taxan 775	£362
• NEC 4FG	£465	• Taxan 795	£397
• NEC 5FG	£850	• Taxan 875	£685
• VIDC Enhancer Board			£25

(We will supply the Watford's superior Multiscan VIDC Enhancer for Archimedes micro at only £10, if purchased with any Eizo or Taxan monitor.)

(P.S. Taxan 795 monitor is supplied with a FREE VIDC enhancer board)

Aries AlphaScan Monitor

Pound for Pound, the AlphaScan VGA Multiscan monitor provides the maximum performance and greatest flexlbility of any 14" colour monitor for the Archimedes micro.

Its multiscan circuitry provides automatic adjustment for frequencies between 30 and 60KHz horizontal, and 50 and 90Hz vertical. Its 0.28mm dot pitch high resolution tube provides super sharp text graphics, while a high speed (70/72Hz) refresh rate provides a flicker-free display easing the eye strain. The Multivideo VIDC Adaptor supplied (free) with the monitor allows high resolution operation in all screen modes.

£325

Philips Monitors

• **BM7502** 12" Hi-res Green Monitor	£67
• **CM8833** 14" Med. Res Colour Monitor	£167
• Dust Cover for Philips Monitors	£6

STAR BUY

- **PHILIPS 14"** Medium Res, dark glass, attractively finished Colour Monitor. A push-button switch toggles between Hi-Res monochrome green text mode and full colour display. (Please state the type of Connecting Lead you require).

ONLY £166

Spare Monitor Leads

BNC Lead for Zenith or Philips	£3
Skart Monitor Lead	£5
RGB lead for TAXAN Monitors	£3
Archimedes Colour Monitor Lead	£7.50

Concept Keyboards

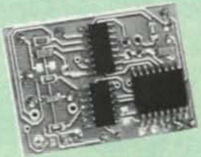
Standard A3 Keyboard with BBC Software	£138
Standard A4 Keyboard with BBC Software	£109
Archi A3 Keyboard	£139
Archi A4 Keyboard	£110

Aries 2000 Colour Monitor

This attractively finished, etched screen medium res monitor is supplied complete with built-in speaker, volume control and video output. All controls are located on the front panel for ease of use. Ideal for BBC, BBC Master, Archimedes and Amiga.

A bargain at £159

VIDC Enhancer



This unique VIDC add-on board for the Archimedes, caters for all types of Multiscan and VGA monitor and mode requirements. There are 2 versions to suit all requirements. The multimode software supplied, provides all the new modes for the selected monitor type, including the now standard Computer Concepts modes. With VGA monitor, you are no longer restricted to a few modes. A WIMP application supplied on disc, allows new modes to be designed and existing modes to be modified for particular monitors.

Super VGA VIDC Card: A unique electronic design allows the horizontal and vertical sync to be buffered and have the polarity changed under software control

£45

MultiVideo VIDC Card: As above but for MultiScan monitors only.

£25

Panasonic Printers

• KX-P1123	£129	• KX-P1695	£272
• KX-P1124i	£173	• KX-P2624	*£295
• KX-P1170	£100	• KX-P2180	£165
• KX-P1624	£272	• KX-P2123	£219
• KX-P1654	*£335		

*** Price includes 12 months On-site warranty**

Cut Sheet Feeders

P36 – 1124/24i	£79	**P37** – 1123/70/80	£69
P38 – P1624/95; P2624			£129

Buffers

P12 4K Buffer Board for KX-P1081	£55
P14 32K Buffer P1123/24/70/80 P1540/92/95; P1624/54/95	£16

Serial Interfaces

P19 for P1123/24/24i/70/80/1624/54/95/2624	£49

Citizen Printers

• 120D Plus	£100	• Swift 9	£134
• 124D	£145	• Swift 24E#	£234
• 224	£185	• Swift 24X	£299
• PN-48	£209	• PN48 Ribbon	£4

# FREE Colour Option with Swift 24E

• Swift 9 Colour Option		£19
• Swift 24 Colour Option		£29
• Swift 24 Ribbons	Black **£4**	Colour **£13**
• Citizen/Archimedes Colour Printer Driver		£15

Integrex Colour Jet

• Colour Jet 132 Printer	£449
• Paper Roll	£6.50
• BBC Screen Dump Software	£10
• Colour Cartridge	£21
• Black Cartridge	£12.40
• 100 A4 OHP transparencies	£55
• 8K Serial Interface Optional	£123
• Colour Jet 2000	£POA

Star Printers

• LC15	£173	• LC200 Colour	£143
• LC20	£100	• SJ48 Inkjet	£174
• LC24-10	£133	• XB24-200 Colour	£295
• LC24-15	£240	• XB24-250 Colour	£355
• LC24-20	£169	• XB24 Colour kit	£29
• LC24-200	£164	• ZA200 Colour	£234
• LC24-200 Colour	£203	• ZA250	£297
• Star/Archimedes Colour Printer Driver			£15

Star Accessories

Cut Sheet Feeder

LC10/200/24-10	£65	LC15/LC24-15	£125
XB24-10	£80	XB24-15	£139

Serial Interfaces

8K Ser LC-200; LC24-200; FR10; FR15; XB24-10; XB24-15	£52

Buffers

32K Ram Card for LC/XB24-10; 15; LC200	£55

Ribbons

LC10; LC10-II; LC15	Black **£4;**	Colour **£6**
LC-200; LC24-200	Black **£5;**	Colour **£12**
XB24-10; XB24-15	Black **£5;**	Colour **£12**

Laser Printers

All Laser Printers include 12 months On-site maintenance

• Brother HL-4	4ppm	£594
• Brother HL4-V	4ppm	£694
• Brother HL4-PS Postscript	4ppm	£1079
• Brother HL8-V	8ppm	£1044
• Canon LBP-4+	4ppm	£575
• Canon LBP-8 III	8ppm	£970
• Canon LBP-8III Plus	8ppm	£965
• Epson EPL4100	6ppm	£550
• Epson EPL7500	6ppm	£1150
• Epson EPL8100	10ppm	£965
• HP Laserjet IIP+	4ppm	£625
• HP Laserjet III	8ppm	£1015
• HP Laserjet IIID	8ppm	£1499
• HP Laserjet IIIP	4ppm	£705
• HP Laserjet IIIsi	16ppm	£2525
• Panasonic KX-P4420	8ppm*	£620
• Panasonic KX-P4450i*	11ppm*	£925
• Panasonic KX-4455 Postscript	11ppm*	£1450
• Panasonic KX-P4430 Satin Print*		£999
• Star LP-8 III 2	8ppm	£1249
• Star LP-8 III	8ppm	£910
• Star LP-8 Star(post)script	8ppm	£1140
• Star LP-4	4ppm	£565
• Star LP-4PS Postscript	4ppm	£779

* Now with 2 years On-site warranty

Laser Toners

Canon 2, 3 & 4	£46	Star LP-8	£56
Epson GQ	£13	KX-P4420/50	£19
EPL 4100	£59	Laserjet HP IIP & IIIP	£42
EPL7100	£82	Laserjet II/D, III/D	£48
EPL7500	£99	Qume Crystal (3)	£58

Laser RAM Upgrades

• IIP & III 1MB	£51	• EPL7100 256K	£39
• IIP & III 2MB	£88	• GQ5000 512K	£42
• II & IID 1MB	£64	• KX4420/50 1M	£75
• II & IID 2MB	£99	• KX4420/50 2M	£115
• II & IID 4MB	£146	• KX4420/50 4M	£195
• Canon LBP4 1M	£105	• Star LP8 1M	£139
• Canon LBP8 2M	£125	• Star LP8 2M	£275

Laser Drum & Developer

• Epson Drum	GQ5000	£93	EPL7100	£129
• Panasonic 4420 Drum		£60	Developer	£59
• Panasonic 4450 Drum		£93	Developer	£80
• Qume Drum		£76	Developer	£56

Jetpage Postscript Cartridge

• HP IIP/III	£225	IID & IIID	£227

Various Add-Ons

• Laserjet Appletalk Interface	£135
• HP Adobe Postscript	£399
• Pacific Page Postscript	£259
• HP Premier Font Collection	£28
• Laserjet various Font cartridges	from £45

Hewlett-Packard Printers

• # Desk Jet 500	£285	• Paintjet XL	£1045
• Desk Jet 500 Col.	£449	• Quiet Jet Plus	£384
• Paint Jet Colour	£430	• HP Think Jet	£265

# 3 years extended Parts & Labour warranty	£49
• DeskJet 500 Cart. Black **£15;** Colour	£27
• Paintjet Cartridges Black **£19;** Colour	£23
• Desk Jet 500 256K RAM cartridge	£99
• HP Epson FX Emulation Cartridge for Desk Jet	£59
• DJ 500 High Capacity Black Cartridge	£21

Plug In Font Cartridges for DJ 500

• 22706B – Prestige, Elite, Line Draw fonts	£55
• 22706C Letter Gothic & HP Line Draw fonts	£56
• 22707P – Proprint Emulation Cartridge	£57
• Desk Jet Unlimited (Book No VAT)	£19.75

Canon Bubblejet Printers

	Printer	CSF	D'ble Bin	Ink Cart
BJ10EX	£183	£43		£16
BJ300	£289	£88	£65	£12
BJ330	£380	£110	£79	£12
BJC800C	£1419			

• Spare Battery pack for BJ10E	£33

NEC Pinwriter Printers

• P20	£180	• P70	£419
• P30	£240	• P90	£635
• P60	£325		

• P60/70 Colour Option Kit	£59
• Ribbons Black for P20/30 **£6** for P60/70/90	£7
• Ribbons for P60/70/90 Black **£9** Colour	£13.50

Cut Sheet Feeders

P20 **£59;** P30 **£85;** P60 **£89;** P70/90 **£80**

Epson Printers

DFX5000	£1079	LQ1060 Colour	£595
DFX8000	£1960	LQ1070	£313
FX850	£264	LQ1170	£435
FX1050	£336	LQ2550+	£675
LQ100	£159	LX400	£101
LQ200	£162	LX850+	£140
LQ450	£165	LX1050	£206
LQ570	£205	SQ850	£432
LQ860 Colour	£444	SQ2550	£625
LQ870	£362		

Cut Sheet Feeders for

LQ570, LQ870			£47
LX400/850/LQ200/400/450/500/550 LQ1010/1070/1170			£72
LX1050	£115	FX850/LQ860	£128
FX1050/LQ1060/SQ850			£155
LQ2550	£299	SQ2550	£210

Tractor Feed for

LQ800 **£44;** LQ850/FX850 **£69;** LQ1050/FX1050 **£85;** LQ2500 **£90;** LQ2550 **£90.**

Accessories

• EX800/1000 Colour Option	£45
• EX800/1000 Colour Ribbon	£14
• LQ2500 Colour Option	£65
• Multifont Card for LQ550/850/1050	£95

Epson Printer Interfaces

RS232	£28	RS232 + 2K Buffer	£52

Printer Leads

BBC Centronics 4' long	£5
BBC Centronics 6' extra long	£7
Compact's Special Centronics Lead	£7
Nimbus Centronics Lead	£6
IBM/Archimedes Parallel Lead 6'	£4
IBM/Archimedes Parallel Lead 5 metres	£10
IBM/Archimedes Parallel Lead 10 metres	£15
Double Ended 36 way Centronics Lead 4'	£7
Double Ended 36 way Centronics Lead 6'	£9
MSX Centronics Parallel Lead 4'	£12
RS232 Leads (Various)	P.O.A.
IBM Keyboard extension lead coiled	£5

Plotters

• HP7440AU	£525	• HP7475AU	£715

Roland Plotters

• DXY1100	£490	• DXY1200	£620
• DXY1300	£825	• DXY2500	£2345
• DXY3500	£2955	• Sketchmate	£310
• Roland plotter Pens, Fibre tip			£7.50

Listing Paper (Perforated)

• 1,000 Sheets 9.5" x 11" Fanfold Paper	£7
• 2,000 Sheets 9.5" x 11" Fanfold Paper	£11
• 1,000 Sheets 9.5" x 11" NCR 2 Part Fanfold	£21
• 1,000 Sheets 15" x 11" Fanfold Paper	£9
• 2,000 Sheets 15" x 11" Fanfold Paper	£16
• 1,000 Sheets true A4 Fanfold Paper 70gms	£11
• 2,000 Sheets true A4 Fanfold Paper 70gms	£21
• Teleprinter Roll (Econo paper)	£4

(All our Fanfold paper is Micro perforated leaving a smooth clean edge when the tractor feed strips are detached).

Carriage 1K Sheets £2.50, 2K Sheets £3.00

Printer Labels

(On continuous fanfold backing sheet)

1,000 90 x 36mm (Single Row)	£6.00
1,000 90 x 36mm (Twin Row)	£6.25
1,000 90 x 49mm (Twin Row)	£7.50
1,000 102 x 36mm (Twin Row)	£6.75

Laser Printer Labels on A4 Sheets

3750 70 x 29mm (3 Rows)	£13.50
3000 70 x 37mm (3 Rows)	£13.25
2625 70 x 42mm (3 Rows)	£13.00

Printer Ribbons & Various Dust Covers

Type	**Ribbons**	**Dust Covers**
BBC Micro	–	£3.50
BBC Master	–	£4.00
Archimedes Micro pair	–	£9.00
Citizen 120D	£2.75	£4.50
DMP2000	£2.75	£4.75
DMP4000	£3.75	£4.85
EX800/1000	£3.50	£5.00
RX/FX80/85/800/MX80	£2.95	–
FX/MX/RX100/1000	£3.95	–
Kaga/Taxan KP810/815	£3.25	£5.00
LQ400/500/550/800/850	£3.25	£6.00
LQ1050/LQ2500	£4.00	–
LX80/86/800/850	£2.75	£4.50
LX400	£3.50	£5.00
M1009/GLP	£2.95	£3.75
NEC P2200	£4.50	£5.00
Panasonic KX1080/81	£3.25	£4.75
Panasonic KX-P1124	£7.00	£5.00
Star LC24-10	£2.95	£6.00
Olivetti Ink Jet Cartridges (set of 4)	£6	

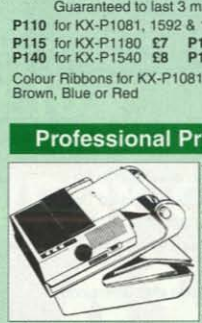
Original Panasonic Ribbons

Guaranteed to last 3 million characters

P110 for KX-P1081, 1592 & 1595			£6
P115 for KX-P1180	£7	**P145** for KX-P1124	£7
P140 for KX-P1540	£8	**P155** for KX-P1624	£8

Colour Ribbons for KX-P1081, 1592 & 1595 Brown, Blue or Red	**£9 each**

Professional Printer Stand



The professional printer stand takes hardly more space than your printer. Due to the positioning of the paper feed and re-fold compartments ie. one above the other, the desk space required for your printer functions is effectively halved. Its ergonomic design ensures smooth paper flow and automatic refolding.

80 Column version £24 (carr. £3)
132 Column version £29(carr. £4)

Universal Printer Sharers/Changer

Connect up to 5 Micros to 1 printer or 5 printers to 1 Micro with our combined, Sharer/Changer switch boxes.

Standard Low Cost Type

Connects	**Serial**	**Parallel**
• 2 to 1	£10	£11
• 3 to 1	£13	£14
• 4 to 1	£16	£17

Professional Type

Connects	**Serial**	**Parallel**
• 2 to 1	£17	£18
• 3 to 1	£22	£25
• 5 to 1	£34	£38

Cables extra at £6 each

2 Way Compact Printer Switch

A handy 2 way printer switch can be attached to the micro or monitor for ease of use.
• Centronics **£18;** • Serial **£17**
(Cables extra at £6 each)

Auto Printer Sharer Switch

Connects	**Serial**	**Parallel**
2 to 1	£40	£45
4 to 1	£62	£49
8 to 1	–	£89

256k Multi Spooler

These Auto Parallel Printer Sharers have built-in 256K of Printer Buffers. They can be used as Auto Sharers, Printer Buffers or both.

• 2 In/2 out	£135	• 4 In/2 out	£169
• 8 In/1 out	£199		

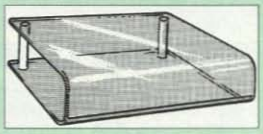
Compact Converter Units

Serial to Parallel	£36	Parallel to Serial	£37

Laser Direct

• Laser Direct Qume 6ppm complete	£749
• Special High Res Card 600 DPI for Canon LPB 4 & LPB 8 Laser Printers	£315
• LPB 4 Printer plus High Res Card	£875
• LPB 8III Printer plus High Res Card	£1275

Perspex Printer Stand



Give your Computer System a touch of Class with our elegant, smoke finished Perspex Printer stand.

80 Column version	**£16** (carr £3)
136 Column version	**£20** (carr £4)

Continued→ → → → → → → → →

QUEST MOUSE Mk III

• Quest Mouse III & Quest Paint	£59
• Quest Mouse III, Quest Paint, AMX Stop Press & Pagefont	£89
• Quest Mouse III only	£30
• Quest Paint Software only	£34
• Quest Font Disc (22 Text Fonts)	£15
• Quest Mouse Mat (Red or Blue or Green please specify)	£3
• Quest Colour Dump Disc – This new software allows you to print direct from Quest Paint to your Integrex Colour Printer	£18

(P.S. Quest Paint is not compatible with BBC Compact)

Quest Paint is the winner of the BBC Acorn User 1990 Award for the Best Art/Graphics software

ConQuest

Quest combined with ConQuest and Acornsoft GXR ROM make up THE MOST POWERFUL drawing packages available for the BBC range. Quest Paint is able to take advantage of almost any additions to your machine, such as Shadow or Sideways RAM. ConQuest takes this principal even further, by utilising the otherwise normally incompatible Sideways RAM facility by holding pictures in them.

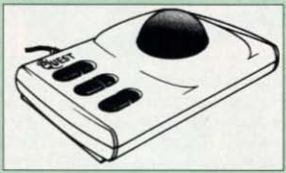
ConQuest ROM Package £30

(Price includes software in ROM and a comprehensive Manual).

(Not Compatible with BBC Compact)

Quest – Tracer ball

An attractively finished, extremely reliable, mouse replacement, input device. Requires very little desk space. Connects directly to your BBC B, BBC Master or Archimedes Micro.



QT-10 BBC/Master Version	£25
QT-20 Archimedes Version	£26

Mouse Cleaning Kit

To obtain trouble free operation and prolong the life of your mouse, the high tech rodent requires regular cleaning. Our deluxe mouse cleaning kit is ideal for the purpose £3

Mk II Light Pen

Ideal for BBC B and Master. Price includes software on disc and operating manual £17

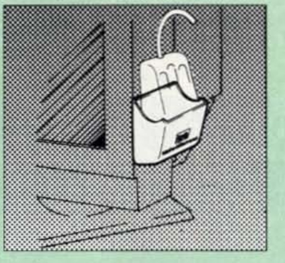
Mk III AMX MOUSE

• AMX Mouse plus Super Art £54

(Please specify for BBC, Master or Compact)

• AMX MOUSE ONLY	£29
• AMX SUPERART Package	£29
• AMX STOP PRESS – A Desktop publishing software. Works with Keyboard, Joystick or a mouse	£25
• PAGE-FONTS – Over 20 Fonts for use with AMX Pagemaker	£13
• AMX DESIGN (ROM)	£34
• AMX XAM Educational	£15
• AMX EXTRA EXTRA	£16
• MOUSE MAT	£3

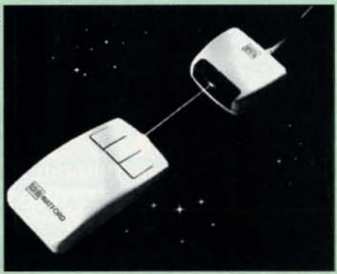
WE Mouse House



Treat your mouse to a cosy Mouse House. This handy little gadget solves the problem of where to store your mouse when it is having a rest. Made of sturdy plastic, the WE Mouse House attaches to the side of your computer, monitor, disc drive etc.

Only £3

Archi Cordless Mouse

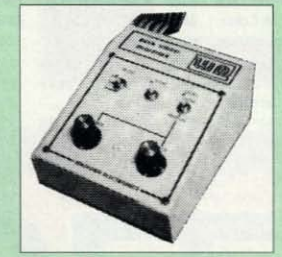


Features

- Infra Red Signal Transmission
- High Resolution 200 DPI
- High Tracking Speed of 600mm/s up
- Anti-static Silicon Rubber Coated Ball
- Low Friction Teflon Footpads
- Power - by two AAA size batteries (not included)
- Automatic Standby Mode after 5 seconds inactive
- Auto Power Shut-Down after 20 seconds inactive

Price £59

BEEB VIDEO DIGITISER



"Test Bureau Approved for Use in Education"

Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro. This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket. The software supplied includes a sophisticated, fast screen dump routine.

Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem. The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.

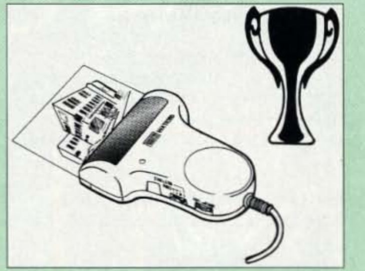
£99

(BBC B+ and Master compatible, except Master with Econet)

(Price includes) Digitiser Unit, Software in ROM & a Comprehensive Manual)

Beeb Hand Scanner

Hand-held Scanner for the BBC Micro



Watford Beeb HandScan is a compact unit which will allow photographs, diagrams, or any other documents to be digitised quickly and easily, to then be used in a desk top publishing package, art program, or even in your own Basic programs!

The HandScan plugs directly into the 1MHz bus on the BBC while a comprehensive set of utilities provided by the sophisticated ROM firmware. The scanner has a resolution of either 100 DPI or 200 DPI when accuracy is essential. Pictures as wide as 4" may be scanned in mode 0 and various types of dithering may be selected to simulate the grey levels of a scanned picture.

All necessary software has been included in the firmware to allow the scanner to read images directly into our Wapping Editor with little more than the click of the mouse. The digitised picture may then be incorporated into your magazine, newsletter, report or any other document.

Beeb HandScan & Firmware	£99

WAPPING EDITOR
"MIGHTIER THAN THE QUILL"

Winner of the BBC Acorn User 1990 Award for the Best DTP/Word Processor

The Wapping Editor

The Wapping Editor from Watford Electronics represents a breakthrough in Desktop Publishing for the Beeb. The package includes a 64K ROM containing ALL the software needed to get into print fast; a very sophisticated graphics module, professional quality typesetting software, a word processor, a comprehensive font editor for designing your own typefaces, and a variety of printer dumps. This mouse-driven system is designed for the BBC B, the B+ and Master computers and will take full advantage of any Sideways and Shadow RAM that may be fitted. It will run under DFS, ADFS and Network filing systems and requires as a minimum just a single 40 track drive.

Included with the system is a utility disc containing several high quality fonts, various utilities and a ROM image of a Support ROM. A comprehensive 100 page manual completes the package. The Support ROM contains routines to allow an area to be rotated to any angle or distorted to any four-sided shape. Also included are facilities to draw ellipses at any angle and sectors, segments and arcs (in Master or BBC B with Acorn GXR). Another of the features of the Support ROM is a 'Turbo DFS' which gives DFS access times comparable with those of ADFS.

Page Layout Section

The Wapping Editor may be used to create pages of any size from an A6 to a full A3 page. If none of the eight default page types suit your purpose, the stand-alone page creation program may be used to create pages to your own requirements. By using proportionally spaced fonts and genuine microspacing it is possible to print over 150 characters across an A4 page. A unique feature of the Wapping Editor is the 'A5 x 2' page size allowing two A5 pages to be printed side by side onto a single A4 sheet.

The graphics module incorporates the facilities like: pencil, brush, airbrush, polygon, circle, eclipse, fill, cut & paste, etc.

Text may be typeset, either justified or unjustified, in any font anywhere on the page. Simply select which font and text document you wish to use, and pull out a rectangle on the page where you want the text to be – it's as simple as that! Multiple columns may be printed just as easily and a special 'expand' feature may be used to expand the microspacing so that the document exactly fits the space defined.

Word-Processor

The integral word processor is the ideal tool for producing your text documents, although text can of course be read in from any of the other popular word processors such as View, Wordwise etc.

The Font Editor

The font editor module will allow you to design your own typefaces or to modify the ones provided on the utility disc. This sophisticated editor has numerous functions designed to take the tedium and frustration out of producing good looking, well balanced fonts. Each character may be individually proportionally spaced and characters of any size up to 16 x 16 pixels may be defined.
Pictures may also be 'grabbed' from a video source by using the Watford BEEB Video Digitiser.

Wapping Editor Software Pack	**£59**
Wapping Editor plus Mouse	**£79**

(Wapping Editor only works with Master Compact if a Mertec Expansion box is fitted)

Wapping Art Disc

Over 250K of clip art to cut and paste into your Wapping Editor pages. Pictures include maps, transport, people, media, sport, games etc.
Two 'ratio' screens for use with hi-res and rotated A5 pages to ensure images are not distorted when printed out.

Music writing symbols in the form of pattern and brush for quick production of manuscripts are included together with staves.

There are two prepared hi-res pages layed out for printing labels, both single and double width. Ready made label designs are included but these can be easily replaced with your own designs.

A Mode 0 screen dump routine is also included. To pack such a large amount of data onto the discs the screens have been compressed and routines to compress and expand Mode 0 screens are included on both discs. Using the packing routine you can archive large numbers of screens onto a single disc.

£15

Wapping Font Disc 1

Sixteen additional fonts, including smaller version of Oberon and Daisy and two new sizes of the standard font for the Wapping editor.
Also included are three Mode 0 screens containing giant 'headline' fonts to cut and paste to create extra smooth headlines.
Supplied complete with instructions. **£12**

Wapping Font Disc 2

This new addition to our Wapping range of DTP software provides you with additional 23 fonts for the Wapping Editor DTP pack. (80 track discs only). **£13**

Archi A4 Scanner

This most advanced Archi A4 image scanner is supplied complete with ROM based podule software. Features provided include facilities for zooming in on an image and inverting the image in X and Y directions, saving and printing of the sprite created. Interactive help is supplied using the !HELP application on the Acorn applications discs.
The 216mm scanning width can cope with both desktop scanning of single sheets, photographs, diagrams, etc., with its fast ten page automatic document feeder, but it can also detach from the feeder to become a convenient hand-held full page scanner for larger documents or pictures.
Scanned image control can be freely adjusted in increments of 10 dots per inch from 100 up to 400 dpi resolution with 64 levels of grey scaling. A built in shading controller and manual brightness control achieve optimum image clarity.
Unlike some scanners, which use a red light source, the Watford scanner uses a yellow/green source which vastly improves the light/dark contrast, thus eliminating the effect where any red-based colours are faded down to white and so do not show up in the scanned image.
All these features and facilities combine to make the Archi Page Scanner the fast and convenient way in which to add that extra impact, interest and clarity to documents, reports, instruction sheets, manuals, news letters, etc., from your Archimedes DTP package.

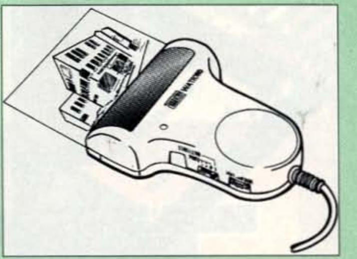
New Low Prices:

Archi A4 Scanner	£269
Sheet Feeder for above	£75
Scanner + Sheet Feeder	£359

Computer Concept Scanlight

• Scan-Light A4	£275
• Scan-Light A4 + Sheet Feeder	£368
• Scan-Light Junior mono	£130
• Scan-Light Junior 256	£197

Archi Mk II Hand Scanner



Watford Electronics is now able to offer a complete hand held scanning package, possibly the most essential addition to any desk top publishing system, for only £119. The package includes the most comprehensive utility software available for the Archimedes, a high quality hand held scanner, and all necessary documentation to get you going straight away.

SCANNER

The scanner is capable of scanning up to an amazing 400 dots per inch (DPI)! The scanning area is 4" wide, and the height is only limited by the maximum amount of memory available. The dot resolution may be switched to 100, 200, 300 or the maximum 400 dpi. One of four operating modes may be selected offering either pure monochrome scanning, or one of three grey level modes. The grey level modes use different size dither patterns to represent up to 16 shades of grey. There is also a dial to allow the "brightness" to be adjusted over a wide range, in order to optimise the quality for any specific image. The scanner interface is a standard, single width, expansion card (podule) which plugs into the Archimedes' backplane. The socket on the rear panel connects the scanner by 1.8 metres of cable.

SCANNER SOFTWARE

Full use is made of the windowing and the multi-tasking facilities of RiscOS. The software is supplied in a 64Kbyte ROM located on the interface board. The scanner appears as a small icon on the desktop icon bar, and the software is retrieved from the ROM simply by clicking on that icon. As you scan a page, the image appears in the scanning window on the screen, scrolling up in real time. The other facilities included in the software are.

Cropping and scaling to any size including stretching and squashing in X and Y direction separately.

Colour tinting.
X and Y flip.

Edge detection which turns solid objects into outlines.

Selective directional copying which allows features (i.e. lines or text) to be made thicker or thinner.

Scanned images may be saved as sprite files or transferred directly into other RiscOS applications (DTP, Draw, Paint) simply by dragging the sprite file into the application's window. Sprites may also be generated using anti-aliasing. This greatly improves picture quality and is particularly effective when scanning material with a range of grey tones, such as photographs. Images can be printed on any printer that is supported by a RiscOS printer driver, with optional settings for portrait or landscape modes, image scale and positioning. Images are printed using the full resolution of the printer and are not limited to the screen resolution.

On-screen help is provided via the RiscOS interactive help facility. Calls are also provided in the ROM for users wishing to write their own software, incorporating the use of the scanner.

AHS-4 Archi 300/400 Version	**£119**
AHS-3 Archi A3000 Version	**£129**

Continued→ → → → → → → → →

Sideways ROM ZIF Socket System

ESCAPE
TAB
CAPS LOCK

Allows you to change your ROMs quickly and efficiently, without opening the lid. The ZERO INSERTION FORCE (ZIF) socket is located into the ROM Cartridge's position.

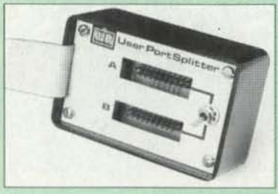
- Very simple to install. NO SOLDERING required. The ZIF eliminates the possibility of damage to your ROM pins when inserting & extracting.
- The low profile of the socket allows unrestricted access to the Keyboard.
- We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.
- BBC, B and B+ compatible. **£18**

ROM Cartridges for the BBC Master

Will also accept the new larger Piggy Back ROMs like: Interword, Interbase, Quest, Conquest, etc

Twin **£8;** Quad **£13**

User Port Splitter Unit



Gone are the days when you had to plug and unplug devices from the User Port. This extremely useful little device allows two units to be connected to the User Port simultaneously, and select between them simply by toggling a switch. This device is particularly useful for those people using Quest Mouse and the Watford Video Digitiser or any similar combination

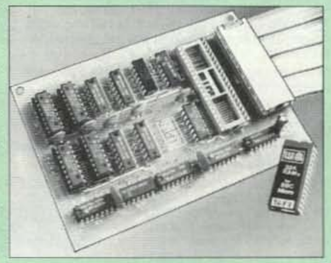
Excellent Value at **£22**

Aries B-488 IEEE-488 Interface Unit

The Aries-B488 is an interface unit to enable the BBC micro to control and monitor IEEE-488 bus systems. The IEEE-488 bus (also known as the 'GPIB or 'HP IB') is the standard method of interconnecting programmable laboratory instruments and control equipment. Using the B488, up to 15 devices may be connected in a single high-speed data network.

£238

32K Shadow RAM/Printer Buffer Card Expansion Board



A MUST FOR WORD PROCESSING

Simply plug the ribbon cable plug into the 6502 socket and gain a massive 32K of extra RAM.

- While word processing, you don't wait for a slow printer, type in text while printing and save on expensive printer buffers.
- "VIEW" Wordprocessor users can now type in letters in 80 columns and have up to 28K bytes free – 5 times as much as normal.
- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24k of text in memory. This product is recommended as an ideal complement by Computer Concepts.
- Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20k of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28k of program space.
- Use the full 32k or the bottom 12K of the expansion RAM as a printer Buffer. (P.S. Only 12K printer buffer can be used with Wordwise & WW+, due to the way they are written).
- Unique facility to turn ROMs off and on again.

Only £54

(Price includes a comprehensive manual and the ROM)

- ARIES B-32 Shadow RAM Card **£55**

Commander Joystick

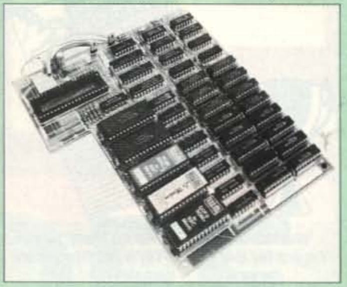
Watford Electronics' new Commander Joystick for the BBC B and Master 128K has a unique dual mode of operation giving selective free floating or self centring fully variable control in both X and Y axis directions. Commander is particularly good for flight simulation and drawing programs.

Features:

- Direct connection to BBC Analogue input port – no interface needed.
- Fully compatible with all BBC Joystick controlled games programmes.
- Switchable springs allow selection of floating or centring operation.
- Trim adjusters for both X and Y axes for fine centre adjustment.
- Convenient stick mounted fire button with additional base buttons.

Price: £15

ROM/RAM Card



- NO SOLDERING required to fit the board.
- Fully buffered for peace of mind.
- Compatible with BBC micros (not BBC+ or Master).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM.
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- FREE utilities disc packed with software.
- Large printer buffer.
- UNIQUE fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROMSPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

PRICES:

• ROM/RAM card with 32k DRAM	**£42**
• ROM/RAM card with 64k DRAM	**£54**
• ROM/RAM card with a massive 128k DRAM	**£89**

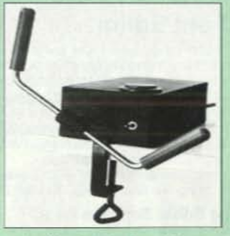
OPTIONAL EXTRAS:

• 16k plug-in Static RAM kit	**£8**
• 16k DRAM for Upgrade	**£13**
• Battery backup	**£3**
• Read and Write protect switches	**£2 each**
Complete ROM-RAM card with all options fitted	**£109**

Voltmace Joysticks

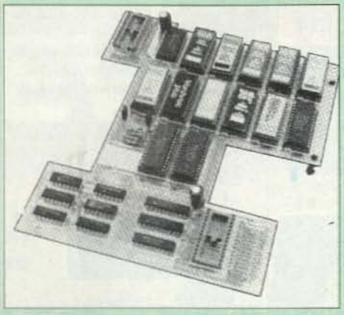
Delta 3B Single Joystick	**£10**
Delta 3B Twin Joysticks	**£15**
Delta 3C Joystick for Compact	**£10**
Delta 14B Single Joystick	**£11**
Delta 14B/1 Adaptor Module	**£12**
Transfer Software Disc-Tape	**£7**
Delta-Cat A mouse eliminator Joystick for the Archimedes	**£24**

Delta Base B



Analogue aircraft style yoke Joystick to run in the analogue port of the BBC B & Master 128 **£25**

Solderless Sideways ROM Socket Board



The key features of this no fuss, easy to install card are:

- Increases your BBC Micro's ROM capacity from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 takes two 6264 RAM chips.
- Read protect to make RAM "Vanish") allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

Price: Only £35
Battery Backup fitted **£39**
Battery Backup only **£3**
16K Sideways RAM **£8**

- Sideways RAM Utilities Disc for Solderless ROM Board. Includes the options to load and save ROM Images and the facility to use Sideways RAM as Printer Buffer. **Only: £8**

BBC Educational Software

Maths with a Story 1 (Disc). 4 primary level maths programs	£20.00
Maths with a Story 2 (Disc). 4 further maths programs.	£20.00
Picture Craft (Disc) 6-14 age group. Pack consists of flexible geometrical design & colouring programs.	£17.00
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Classification & Periodic Table O-Level. The suite is supplied with its own database of chemical elements which can be classified according to your own rule.	£20.00
ADVANCED TELETEXT SYSTEM	£8.65
PERIOD TABLE SOFTWARE	£20.00
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A Vous La France	£29.00
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FUN SCHOOL 2 – Green: 6-8 yrs	£12.25
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FUN SCHOOL 3 – Red	£18.50
FUN SCHOOL 3 – Green	£18.50
FUN SCHOOL 3 – Blue	£18.50
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More French Games – Another 6 games 12 years+	£26
Au Restaurant and Accident de Route 12 years+	£26
Boulogne and Oh-Les – 2 programs for beginners	£26
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Six German Games – Aimed at pupils in their first year, but useful as revision for more advanced student of German. 12 years+	£22
More German Games – Aimed at pupils in their 2nd year of learning German. 12 years+	£22
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Puncman 1 & 2 for 7 – 13 years	£15
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Puncman 5 & 6 for 8 – 15 years	£15
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Help Your Child learn Basic Map work No. 2 (9-14 years)	£18
Pirate – Educational Adventure (8-14 years)	£15
Spelling Week by Week (6-14 years)	£18

Archimedes Software

Animated Alphabet (3-6 yrs)	£21
Arcventure (8-12 yrs)	£29
Bookbinder	£43
Bumper Disc	£14
Bumper Disc 2	£14
Craftshop 1	£26
Craftshop 2	£26
Converta-Key	£16
Data Word	£16
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DigiSim	£35
Dream Time (5-7 yrs)	£23
Droom	£19
Farm (5-7 yrs)	£19
Fleet Street Phantom (9-13 yrs)	£25
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(All ready made and tested)

CASSETTE LEADS 7 pin DIN Plug	
to 3 pin DIN Plug + 1 Jack Plug	£2.50
to 7 pin DIN Plug	£3.00
to 3 Jack Plugs	£2.50
6 pin DIN to 6 pin DIN Plug (RGB)	£3.00

Disc Drive Power Leads

Supply from BBC power supply to standard Disc Drive Connection: Single **£3.00;** Dual **£3.75**

Disc Drive Interface Leads

BBC to Disc Drives Ribbon Cable
Single **£4** Twin **£6**

Miscellaneous Connectors

	Plugs	Sockets
RGB (6 PIN DIN)	50p	75p
RS423 (5 pin Domino)	70p	80p
Cassette (7 pin DIN)	40p	95p
ECONET (5 pin DIN)	35p	50p
Paddles (15 pin 'D')	150p	250p
Disc Drive Plug 4 way	100p	–
6 way Power Connector	120p	150p

Watford DATA DUCK

Convert two single Disc Drives into one Dual Drive with this simple external unit (Suitable for Disc Drives with PSU. For Disc Drives without PSU, you will also require Watford Power Duck, see below). **£14**

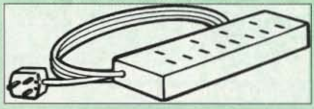
Watford POWER DUCK **£8**

Surge Protector Plug

Fitted in place of your normal mains plug, this device protects your equipment (and data from corruption), against mains high voltage translent spikes/surges caused by lightening or thermostats switching.

Protection for only **£8.50**

4 Way Mains Distribution Socket



4 way top quality mains trailing sockets.
Supplied wired up with mains plug ready for use.
Can be screwed to floor or wall if required.
Very useful for tidying up all the mains leads from your peripherals.

£9.50

Aries Spike Cleaner Unit

A 4 way mains distribution unit as above with a built-in Surge Arrester, providing protection for your complete Computer/Hi-Fi System

£16

28pin DIL Header Plug

SOLDER type **£1.50** IDC CRIMP type **£1.95**

8 Way DIP Switch

Increase the speed of your Disc Drives by soldering this switch to your BBC B or B+ keyboard

Only **£1.00**

28 pin ZIF SOCKET (Textool) **£6.95**

Continued→ → → → → → → → →

Computer Concept's ROMS

Disc Doctor	£18
Inter BASE	£49
Inter CHART	£25
Inter SHEET	£37
Inter WORD	£36
Mega-3 ROM	£76
Spell Master	£42

Wordwise plus

£40

We are giving away absolutely **FREE,** the superb Word-Aid ROM worth £24, with every WORDWISE PLUS package bought from us.

Word-Aid

This advance utilities ROM extends the power of your Wordwise plus ROM.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear test-segment area.
- BBC B, B+ and Master compatible.

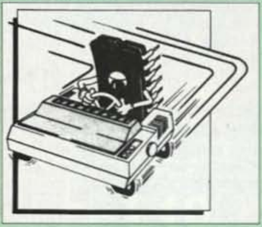
Only **£24**

(N.B. Word Aid requires a Disc interface in your Micro)

Acorn ROMS

View 3.0 ROM	£45
Viewsheet (Acornsoft)	£36
Viewstore	£36
Viewspell – 80T disc	£25
Viewplot Disc	£20
(Please specify for Master 128 or Compact)	
View-Index	£12
Hi-View	£38

View Printer Driver ROM



View is a powerful word processor, but it seriously lacks in terms of printer driver support. With the View Printer Driver ROM, the View users will find themselves in the realms of advanced word processing.

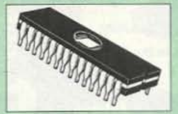
Price: Only £29

Mini Office 2 – Disc

for BBC B & B+	£12
for BBC Master	£14
for BBC Compact	£16

(When ordering please specify for which Micro & 40 or 80T Disc)

Assorted ROMS



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74LS245	£1.00
74ALS245	£2.75
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Acorn Speech Synthesizer package complete, for the BBC B Microcomputer

Special Offer £14

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CASHBOOK – A complete "Stand Alone" accounting software package for the cash based sole trader/ partnership business.

FINAL ACCOUNTS – Trial Balance with inbuilt rounding routine; Notes to the accounts; VAT Summary; Profit & Loss A/C; Balance Sheet.

MAILIST – A very versatile program.

EASILEDGER – Provides instant management information.

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All this for only **£21** (Disc)

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DATABASE – Set up a computerised card index system with powerful search facilities.

SPREADSHEET – Offers many calculation and editing features

BEEBPLOT – Provides visual representation from Spreadsheet data.

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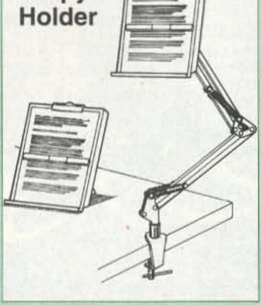

Whether you want to type in your latest program or the draft of a new trilogy, Watford's manuscript holders are superb for holding your paper at the ideal height and angle to allow you to read and type in ease and comfort.

Available in 2 full A4 versions, desk resting and shelf clamping. Paper is held firmly by means of a plastic retaining ruler and a clip grip.

Desk Top **£8**

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NEW Copy holders as above but with a battery operated, remote controlled cursor/ruler. (By hand or foot pedal.) (Batteries 2 x AA not included.)

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24 HOUR
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(0923) 50234 or 33383

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EPROMs need careful treatment if they are to survive their expected lifetime. Over erasure of EPROMs very rapidly turns them into ROMs!

The TEX erasers operate following the manufacturers specifications to give the maximum possible working life by not erasing too fast.

- **ERASER EB** – Standard version erases up to 16 chips. **£34**
- **ERASER GT** – Deluxe version erases up to 18 chips. Has automatic safety cut-off to switch off the UV lamp when opened. **£36**
- Spare UV tubes. **£12**

ROM Extraction Tool

This extremely useful tool allows you trouble free chip insertion and removal from your computer by distributing the removal force over the whole body of any 24 or 28 pin chip. **£2**

Metal Chip Extractor **£3**

Servisol Foam Cleaner

This king size multipurpose foam cleaner spray is ideal for cleaning Keyboard, Monitor, Disc Drive & Computer furniture surfaces.

£2.50

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Ideal for cleaning and preventing static build-up on TV/Monitor Screens.

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Ideal for removing dust & dirt from Keyboard & similar inaccessible spaces. **£3**

PC Cleaning Kit

To avoid data corruption and trouble free use of your PCs, it is advisable to clean your PC System once a week. Our Kit 14 is ideal for the purpose.

Kit 14 – 1 each, 3.5" & 5.25" Cleaning Disk, 2 cleaning pads; Drive head cleaning fluid; 20pcs general purpose wipes; Anti-static screen cleaning fluid; General surface cleaning fluid and a transparent plastic case which can hold ten 5.25" Disks when empty. **£10**

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UHF Modulator	£4
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Stop the Confusion!

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Although Acorn machines (such as the BBC B, the Master, the Archimedes and the BBC A3000) are mainly used in education, most commercial computers use other operating systems, particularly MS-DOS. As a result school computer users are at a disadvantage when moving into 'business' computing. PCs and other commercial computers use MS-DOS as the operating system, so commands for formatting, copying, backing up, printing and the modem are not the same. Even file names are written differently! And did you know that there is one Acorn command which, if used in MS-DOS, wipes everything in the current directory?

'ACORN TO PC' enables you to change over painlessly. It shows clearly and quicly how, why and where the two systems (Acorn and MS-DOS) differ. As with a foreign language dictionary, you can use the book to transfer either way – from Acorn to MS-DOS, or from MS-DOS to Acorn.

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'ACORN TO PC' is written clearly and concisely by Dr. John Lockley, who has wide experience of writing and broadcasting. He is currently appearing as a regular contributor on Radio 5, and is co-author of 'The Complete BBC Computer User Handbook'.

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This manual has been written to reveal the secrets of the mouse. It explains all the principles required by the hardware and associated software, and also example listings for inclusion into custom programs. The manual first details the basic principles of the mouse and a simple program which uses these principles. This information should be adequate for most applications. However, it is possible to improve the performance of the mouse by expanding on the principles already used in the software. This is again fully explained and an example program given.

It is possible to gain a full understanding of the mouse from this manual. For those not interested in exactly how the mouse functions, complete example programs are also included.

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Example programs on Disc £4.95

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(Now reads Archimedes Discs)

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However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out? Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON FX-KAGA PRINTER COMMANDS REVEALED'.

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Continued→ → → → → →

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Up to four drives are supported by the IDE filing system IDEFS, up to two drives can be attached to each expansion card, up to four cards can be installed in a machine. An optional 20Mb or 40Mb hard disc can be supplied on the podule expansion card itself, with its fast transfer rate and power saving modes the drive is ideal for storing commonly used software such as the !Fonts application.

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- Drives can be individually write protected
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- Power saving standby modes supported with configurable timeout
- Drives can be used without translation in native mode for minimum overhead
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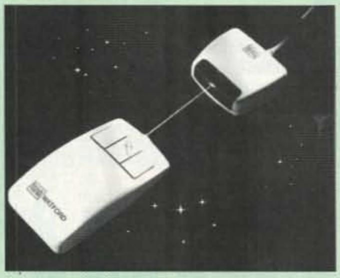

Ever found that using a mouse on a busy desktop has its problems? The cable is always being caught up in papers, tangled round equipment and other cables etc, and what about that cup of coffee spilled over your work!

Watford Electronics' new Cordless Mouse solves these problems by removing the cause for concern - replacing the cable with a simple infra red link. It still provides all the speed and easy control of a conventional mouse, but with complete freedom. In use, there are no operating differences between the standard mouse and the new cordless mouse so all mouse functions and mouse driven RISC software will be fully compatible. Pinpoint accuracy is ensured by a unique Accelerator button, which, when pressed, moves the pointer by just a tiny amount for a large slow movement of the mouse, but by a large amount for a quick wizz of the mouse.

Features

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- Anti-static Silicon Rubber Coated Ball
- Low Friction Teflon Footpads
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Mike Cook answers more of your technical posers

- Modulation
- Faster processors
- Easy upgrading
- Fault finding
- Computing by Tube
- Monitor interface

Brickbat or bouquet?

I OWN an A3000 and for some time have suffered with a standard RF modulator which, compared to my friend's machine that uses a Scart lead, leaves rather a lot to be desired.

A week ago I decided to purchase a Sony monitor-style TV with a Scart socket and bought what I thought was the correct lead to connect the computer to the TV.

When I attempted to do just that, I found that the picture was not present and the sound was very faint. I tried the lead on an Hitachi TV with the same effect.

As you can imagine after spending a considerable amount of money I feel rather angry with Acorn. I now know why my TV modulator has to have a power supply as Acorn have again left out the vital elements to allow the computer to work with third-party equipment.

I hope that you may be able to provide a suitable solution to my problem. I have heard that by connecting a 9v battery to the correct pins in the lead, the TV with work as a monitor – is this true? If so could you give me a diagram showing the connections?

I am also writing to Acorn, as I feel that after spending all this money on a computer I should be able to use it to its potential and as yet have not been able to. Please help as I feel rather disappointed. – **Darren Juggins, Gainsborough, Lincs.**

● *I think you are being rather hard on Acorn here, your problem is not with your computer but your Scart lead. You have not got the correct one or it is faulty – the A3000 will work perfectly well with a Sony TV set and Scart lead.*

The reason why Acorn did not include an RF modulator is that these are expensive when they are required to handle the range of colours produced by the Archimedes. Indeed they produce, at best, indifferent results and most people prefer not to have them.

Remember that the standard package is a computer and monitor. There is no software that can solve your problem – how could it? Most sets have a way of selecting the Scart socket but other models require a switching voltage. If this is the case for you then, try connecting a 9v battery from pin 18 (-ve terminal) to pin 16 (+ve terminal).

I think you should direct more of your anger to the third party who did not fulfil your specific needs, rather than Acorn who have designed a universal and flexible computer.

Chips please

A FEW month ago I decided to expand the memory on my A3000. I plumped for the upgradable board from Atomwide which gave an extra megabyte. The board can be upgraded to 3Mb simply by replacing the eight memory chips. Atomwide charge £195 for this upgrade which I though a bit hefty for eight chips.

On checking in a PC magazine for the prices of memory, I found 256k dynamic ram chips for £15 each. Eight of these would give me a total of 2Mb and cost just £8. Does the Atomwide device use these d-rams and if so can I use them?

I would have a total of 3Mb in my machine. Does Risc OS allow 3Mb rather than the full 4Mb? How about the 1Mb and 4Mb d-ram chips available, could I use them to get eight extra megabytes, or even 32?

Also, the chips are available at several speed ratings: 120, 100, 80 and 70ns. Does the speed of the memory matter or must it match that of the A3000's onboard memory – whatever that may be? – **Kenneth MacLeod, Menstrie, Clackmannanshire.**

● *I make eight chips at £15 to be £120 and not £8.00! I think you've got your wires crossed here. There is no way you can get 3Mb of memory into eight chips because the sums just don't work. However, you can get 4Mb of memory in eight chips – what you do, in effect, is throw away your extra 2Mb and get some more.*

This is because most boards use 1Mb of extra memory along with the 1Mb internal memory to give 2Mb. Whereas for 4Mb they use 1Mb x four chips and throw away the internal memory.

In order to understand memory capacity you need to know that a chip can be described as 256k x four, or 1Mb. In the 256k x four case the first number describes the number of address locations and the four describes the number of input/outputs for each address. If you multiply the two together you get the total bit

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Expanding the BBC B with a 16-bit chip

I HAVE been trying to discover if the 16-bit version of the 6502 chip could be used in a BBC B. Acorn tell me that it has not been used in a BBC B as the circuit board would need a large amount of modification. Will Body Building be delving into this area?

Also I find that I am unable to use the EQU assembler instructions on my BBC Micro, having to use OPT FN instead. I also have an Electron which does use the various EQUs. If I transferred my Electron Basic rom into my BBC Micro would this work? I've read that a new processor has been put on the market which is very fast – faster than the Arm. Will you be publishing details of this? – **Philip Tee, Oxton, Birkenhead.**

● *There is a 16-bit version of the 6502 processor which emulates the normal instruction set and then can be switched into 16-bit mode. It has been available for the last eight years. In fact, it is this processor in the hand-held Game Boy consoles and Acorn did use it in their seldom-mentioned Communicator.*

However, while it sounds superficially attractive I feel it will not be of great advantage to fit one to a BBC B.

The CPU execution speed is governed by the clock and this is synchronised to the display memory access circuitry. Altering this can be done but it is messy. Also, there is some doubt whether the layout of the computer will allow an increase in speed due to the capacitive and inductive characteristics of the PCB wiring.

Finally, the extra instructions would only be of interest to machine code programmers. In short I feel it is not worth doing and there would not be much interest.

If you can't use the assembler's EQU instructions you have the Basic I rom fitted. The Electron Basic rom is different to the standard BBC Basic II rom, but you can get Basic II from Watford Electronics. This will also give you the OSCLI keyword from Basic.

New processors are always being put on the market, so I am not sure which one you are referring to here. A new form of the Risc processor is out, but this is only a re-packaging of the engine that we know as the Risc 3 chip, currently available as an upgrade or built into the latest Acorn machines.

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HELP

P R O B L E M
S O L V E D
HELP

capacity of the memory.

The Risc chip has a 32-bit data bus and so needs its memory 32 bits wide. For a 1Mb upgrade of memory extra you need to use eight 1Mb chips each with four inputs/outputs. As each chip has 256k storage you get a total of:

```
256 x 4 x 8 = 8192k bits, or
8192/8 = 1024k = 1Mb bytes.
```

So you see that you can't get 3Mb of memory that is 32 bits wide without using a lot of smaller chips.

While it is true that memory prices keep dropping, what happens is that everyone wants the high capacity memory, which tends to stay expensive. So to increase your memory to 4Mb you need eight 4Mb ram chips organised as 1Mb x 4. The problem is further compounded in that at the 4Mb chip capacity are a number of different types of packages. You have to make sure that these are compatible with your board.

As to speed: The A3000 accesses the ram at 8MHz and so it would appear that you would need 120nS access time for the memories. However, in fact what you need is 120nS cycle time so access time needs to be about 80nS.

Remember that fitting your own chips invalidates any guarantee both for the board and the computer.

Problem machine

I RECENTLY bought an A3000 and have upgraded it to 2Mb and have been experiencing problems. When I switch on, clicking any of the icons – disc drive, task icon and palette – gives the message *Access to window denied.*

I have also experienced a loading problem when I use Impression. If I leave the computer on for 10-20 minutes, the first fault disappears. Please can you help? – **Richard Town, Prescot, Merseyside.**

● *First of all check that you have no modules unplugged with a *UNPLUG from the command line. Then use the *Status to see if it is configured correctly for your hardware. If the fault still persists it would appear that your upgrade might be playing up. Check that it is installed correctly.*

This is most important if the upgrade involved the soldering of any wires to the track side of the main board. Make sure that there is nothing shorting out. Failing this it has to be a trip to your local Acorn service agent.

A windfall

I HAVE a BBC B Series 7 with an APTL board and I believe it has a Basic I chip – never altered from new – as well as WordWise Plus and SpellMaster roms. These work with a Tatung colour monitor, Panasonic KX-P1081 printer, a double-side disc drive and a 40-track single sided drive. The OS is DNFS 1.2.

My son picked up a BBC and various pieces of hardware at a car boot sale and he generously bought me a BBC 32016 second processor. I connected it to my BBC and it shows:

```
Pandora 32016 Version 0.6
Memory size 1024k
SpellMaster
Acorn DFS
Basic
```

However, I am unable to get any further and when I try *W. I get:

```
WordWise Plus
Exception UND at PC+008144.
```

On reading some back issues of *The Micro User* I found some information about the processor coming with two roms and HiBasic, the other a DNFS with DFS 1.2 and NFS 3.5. I have neither and no manual. It also says that most service roms do not work with the second processor.

Having now retired I had thought about using my computer for producing a family history. However, the B is very limited in this respects and the cost of changing to a Master, or more sensibly to an A3000, is rather too expensive.

Therefore, the sudden and unexpected addition of a second processor would enable me to run a suitable genealogy program – if I could get it up and running. So what I need to know is:

- Is a second processor useful for me?
- What roms and so on would I need?
- What good genealogy program could I use?
- Which DTP systems would you recommend?
- What else would I need to run PC applications?

I also bought a Miracle Technology Modem WS2000 which I have never used but thought might be useful for sending and receiving the odd fax and tap into genealogy banks. On looking at the possible costs, I must ask if this is a worthwhile use of my resources? – **R. E. Barnes, Bolton, Lancashire.**

● *You don't say how much was paid for your second processor, but you might have picked up the bargain of the year. This is the very rare 32016 second processor and were originally on sale for over £1,000. This sort of second processor will not run any BBC software as it was used mainly as a programming workstation.*

In order to use it you need twin double sided 80-track drives and the software. This came originally on nine discs along with eight manuals. With it you can program in Basic, Pascal, C, Fortran, Lisp and 32016 Assembler. I have acquired a few of these second hand with manuals and Musbury Consultants are selling them for £100 + VAT so drop them a line for details. They also have some 6502 second processors for £25.

In order to use your normal BBC software you need the 6502 second processor as this is designed to look as much as possible like a BBC B, although some programs were never Tube *compatible.*

On the software side MicroAid (0465 82288) have been selling BBC genealogy programs for some years. On the DTP side I'd opt for Wapping Editor from Watford Electronics (0923 237774). To run PC software you would need a Co-Pro adapter and a Dos second processor but you'll only get them secondhand.

The WS2000 modem is not suitable for sending and receiving fax messages but could be used to tap into bulletin boards or other remote computers.

Interference

MY A3000 is connected to a Philips 11342 (8833MkII) monitor and ever since I bought them in August I have had a problem with the sound output from the monitor.

When I couple the data lead and the stereo audio lead between the two I get a buzzing sound from the monitor's left and right speaker which sounds just like a bad earth or RF interference. The sound is quite loud when played at full volume and even at half volume it is very annoying. If I unplug either of the leads from the machine the sound is drastically reduced.

I suspected that either the machine or the monitor was faulty. But when I tried the monitor with a friend's A3000 the fault still occurred. I have connected my A3000 to a Mk I monitor and the fault is the same but at a lower level. With either set up the fault disappears altogether when switched from RGB input to composite video – but I have no picture.

We both suspected that there could be something wrong with the circuitry of the computers which when coupled to the monitor via the two leads produces some kind of *earth loop*. I can remove the buzz altogether by coiling the data lead and placing it next to one of the monitor speakers ***or*** unplugging the audio altogether from both machine and monitor and using the A3000 speakers.

Since November my system has been regularly in and out of the workshop under my on-site maintenance plan and numerous tests have been carried out. It even had a optional earth link fitted to one of the boards – under Acorn's approval and recommendation – but to no affect.

Consequently, I have had not much use out of the system and it is very frustrating as I am new to the computer world and eager to learn and work with the machine. Please help. – **Barry Spink, Guiseley, Leeds.**

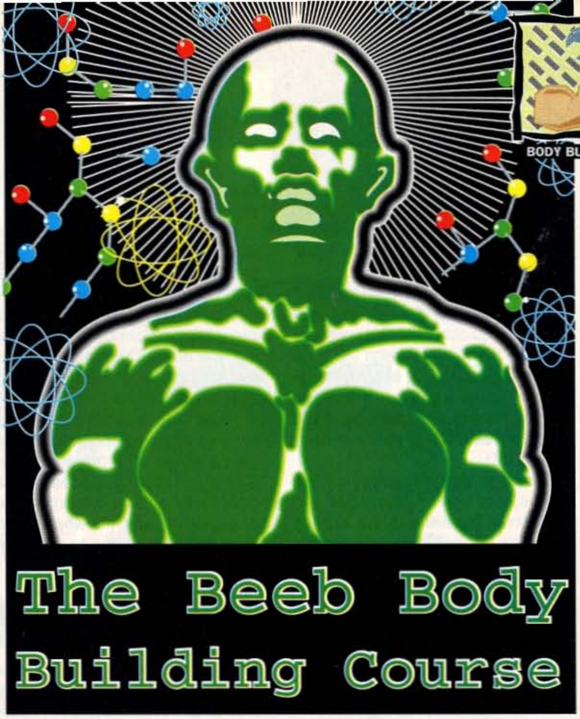
● *The problem here is one of interference pickup on your audio lead. But as all doctors know, naming the problem and curing it are two entirely different things.*

From the work you have done it looks like the problem is with the RGB video signal as coiling it up makes it act like an auto transformer. This is restricting high frequency video signals and letting through the low frequency sounds.

One simple cure might be to get a toroidal core and wind your lead round that. This is often very effective in stopping high frequency band pickup. However, to be really sure your setup needs to be seen by a good audio engineer as it is clear that your computer maintenance people don't know what they are doing.

Micro takes control

Mike Cook sees the infra-red light



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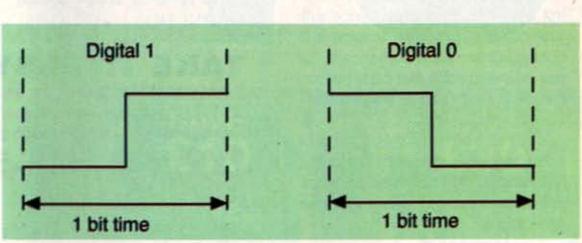

Bi-phase pulses with missing and falling edges

REMOTE control handsets are taking over in the home – one for the TV, one for the video, one for the hi-fi. Even so, you often spend more time looking for the remote controller than you would getting up and pressing the buttons anyway.

However, the remote control handset gives us an opportunity to control devices from the computer. There was Mr. Follett, for example, who wanted to control two VCRs from a computer in place of the hand control to enable him to edit.

Also, supposing you had three hand controllers, you could simulate all of these from the computer. Think about it. When was the last time your computer slipped down the side of a cushion?

Let's look first at how a remote control handset works. Most of them use infra-red, that is light of a wavelength too long for us to see. Fortunately electronic sensors and emitters are much easer to make at these wavelengths than at visible ones.

Basically, the handset transmits a series of pulses of infra-red light. One popular system is the bi-phase system illustrated above. Here a falling edge represents a logic zero and a rising edge a logic one at the centre of the bit time. The signal also makes a transition at the start of the bit time if necessary. Another way is to use the pulse position system as shown in below. Here a pulse is placed in the middle of the bit time for a logic one and no pulse for a logic zero.

This poses a problem when the code consists of a number of logic zeros, as no pulses would be produced. Therefore, if you want to send a logic zero and have just sent one then you have a pulse at the start of the bit time.

Modulation

The same sort of encoding scheme is used in most modern floppy disc systems.

However, it's not quite as simple as this. If this were to be the whole story the system would be susceptible to all sorts of interference.

In order to make sure that only the handset's infra-red is noticed, the beam is modulated, which means that when the beam is on, it is really being switched on and off very rapidly. The modulation frequency is not critical, but is around 55KHz, or 55 thousand times a second.

Our strategy is basically simple – record the infra-red beam pulses and then play them back through an infra-red emitting diode. In some respects this is rather similar to the approach we used with the sound sampler. However, in this case we know that the beam is going to be on or off.

All we need do is to time the on and off periods and record these times. Then we can recreate the signal by using the times as delays between switching on and off.

The effect of doing this is that it does not matter what form of pulse encoding your handset uses.

The simple receive circuit is hown over the page. An infra-red photodiode is connected to a Darlington pair, an arrangement of transistors that gives a gain which is the product of the gain of the two individual transistors.

If the signal is sufficiently strong, the result will be a simple logic output. The rapid modulation of the beam will be removed due to an effect called *excess charge carriers*, again for large signals. The result is that you have to hold the handset very close to the diode to record your signal.

This is fine, as we will only be reading the handset once, and we don't need to do it from the other end of the room. If we did want to have the computer read the handset from a distance that would be another project. I might tackle that one soon.

Hardware help

Before looking at the software let's see how we can re-generate the handset signal, also shown over the page. The modulation signal we need is a little too fast to be comfortably generated by the computer, so we need some hardware to do that for us. This is where the 74LS13 comes in.

This is basically an oscillator running at about 55KHz. We can gate it, turn it on and off from bit 1 of the User Port. This allows either a logic zero or a square wave to be produced from pin 8. We need this sig-

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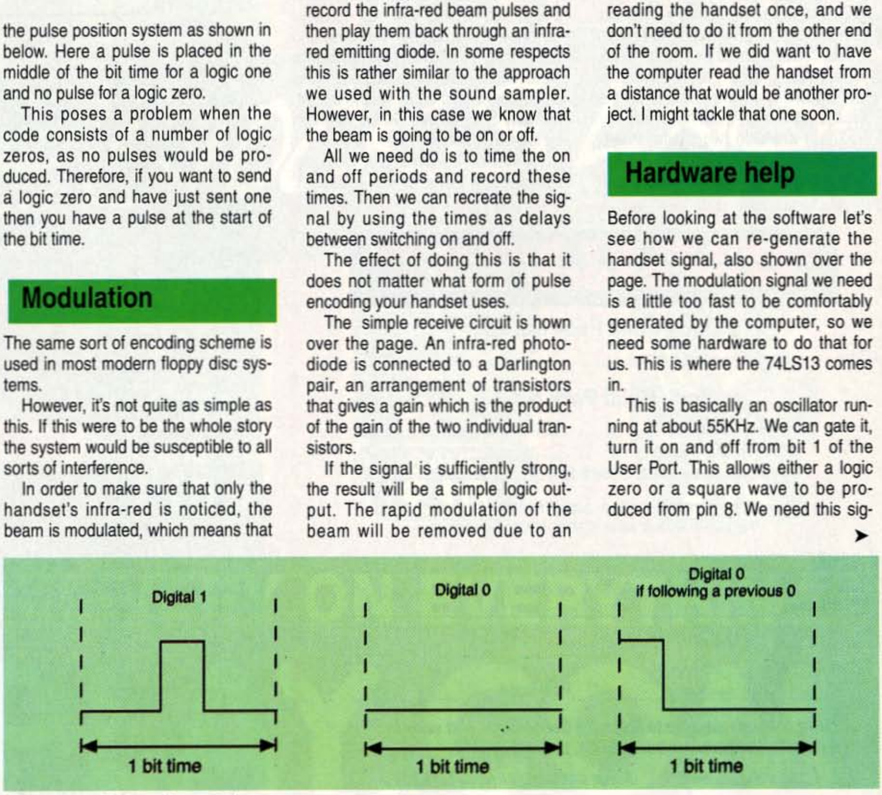

The pulse position encoding method

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nal to drive the infra-red LED, which takes about 100mA, so we need to drive it with something a little heftier than a transistor.

Here I have used a power FET which is capable of switching heavy currents quickly. The 33Ω resistor controls the current through the diode and will allow it to run safely within its power limits. However, it is being turned on and off rapidly, so if you wanted greater range you could lower this to 15Ω.

Another way of increasing the range is to use another diode and resistor in parallel with the existing one. The FET will easily cope with the extra current.

Note that you do need an extra resistor – don't be tempted to use the same one, as LEDs will not share current and you will end up overloading a diode.

Having got the hardware together we need the software to drive it, which is shown in the listing. It is written so that you can extract the parts you need in your own program.

The basic idea is that the record section, lines 1460 to 1630, uses the VIA's timer to measure the time between successive high and low states.

These times are stored in memory after the machine code, and then Basic, reads them back into an array. Finally this array is transferred into a two dimensional array containing the time for all the keys you have read.

There are also two string arrays, K$ and KD$, which contain the key you press to generate a pulse waveform and a descriptive message to go along with it.

You can save the remote control waveforms to disc and load them back. Finally you can replay these waveforms from the keyboard.

Line 30 defines the maximum number of keys you can use – it's surprising how quickly they add up on the average handset, although there is no need to use them all.

I have only tested this system on my own Sony equipment and that uses a system of 13 pulses to generate its message. It is possible that other systems use a different number of segments, which is why the program has been written to accommodate them.

Making waves

Line 40 should be altered to suit. After reading in a key the program draws the waveform at the bottom of the screen. If you see less than 13 low periods on this waveform adjust the number in line 40 to match. If more than 13 pulses are produced by your handset you will still only see 13 on the screen.

Then you must increase the number in line 40 until you see no more increase in the number of pulses and then drop back one. All handsets send the number repeatedly as long as you have your finger on the button, and any extra pulses will be taken up by the next number.

However, you will see a long gap between one message and its repeat. If your handset works at a different pulse speed you can change the division factor in line 1350 to alter the displayed waveform's scale. A handset repeats the message, and in the program line 1230 defines how many repeats there are for each key press. In this case there are five, but it is easily changed.

Construction is quite straightforward and all the parts are available as Body Build pack No. 78. It is built on Veroboard and a suggested layout is included in the pack.

You will also need to be able to connect up to the User Port and the simplest way of doing that is with the transition board and lead, Packs 1 and 2.

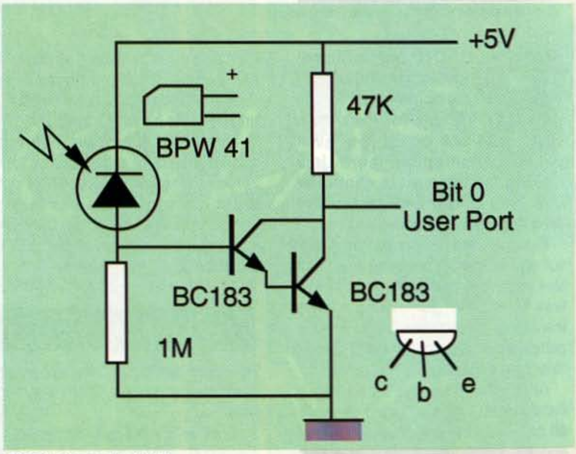
Armed with this you can now control any infra-red remote device with your computer. You can arrange it to change channels automatically for you in time to catch that party political broadcast with you missing a minimum of the Cup final.

It can also be used to program your video recorder, or simply replace a lost handset. Anyway, now you know how to do it you can devise your own applications.

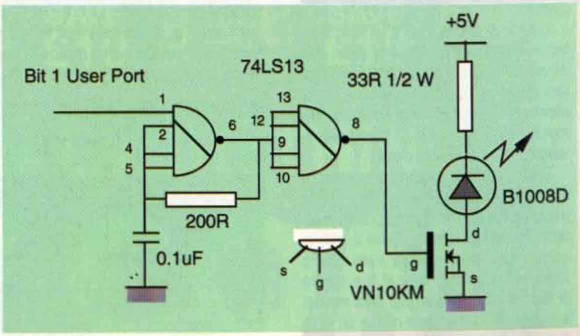
```
   10 REM > <BasicSave$Dir>.IR
   20 REM By Mike Cook
   30 MODE4
   40 PRINT"IR Remote control reader"
   50 NK%=19 : REM NUMBER OF KEYS
   60 NP%=13 : REM NUMBER OF PULSES
   70 NXK%=0:?&FE62=2
   80 A%=?&FE60 AND &FD
   90 NN%=(NP%*2)-1
  100 DIM CODE% 300,Time%(NK%,NN%),K$(NK
%),KD$(NK%),TTime%(NN%)
  110 PROC_INIT
  120 REPEAT
  130 PROC_TITLE
  140 A$=GET$:PRINTA$
  150 IF A$="N" OR A$="n" THEN PROC_GETK
  160 IF A$="U" OR A$="u" THEN PROC_KSEN
D
  170 IF A$="R" OR A$="r" THEN PROC_SHOW
  180 IF A$="S" OR A$="s" THEN PROC_SAVE
  190 IF A$="L" OR A$="l" THEN PROC_LOAD
  200 IF A$="Q" OR A$="q" THEN END
  210 UNTIL FALSE
```

TAKE IT EASY

If you would like to save the wear and tear on your fingers you'll find this listing – together with all the others from this issue – on this month's disc, sent free if you subscribe to *The Micro User*



The simple receive circuit



The infra-red transmitter circuit

BEEB BODY BUILDING PACK ORDER FORM

Body Build Pack No. 78

☐ Infra-red handset emulator £6.70

Body Build Pack No. 1

☐ Transition board kit £9.98
☐ Transition board assembled £11.00
☐ Assembled cable for transition board £7.50

If you don't want to cut out or copy the order form from this magazine simply write stating what you require

Name ______________________________

Address ______________________________

____

____________________ Post code __________

Make cheques payable to Musbury Consultants and send to:
8 Fairhill, Helmsmore, Rossendale, Lancs BB4 4JX

Educational orders welcome *Foreign orders add £3 if paying by Eurocheque*

```
 220 DEF PROC_TITLE
 230 CLS
 240 PRINTTAB(0,5)"IR Remote control re
ader"
 250 PRINT"By Mike Cook"
 260 PRINT:PRINT
 270 PRINT;NXK%;" Keys defined from a p
ossible ";NK%+1
 280 PRINT:PRINT"N - New key defined"
 290 PRINT"U - Use keys to send IR"
 300 PRINT"S - Save timings to disc"
 310 PRINT"L - Load timings from disc"
 320 PRINT"R - Review defined keys"
 330 PRINT"Q - Quit"
 340 PRINT:PRINT
 350 PRINT"Select ";
 360 ENDPROC
 370 DEF PROC_SHOW
 380 PRINT"Computer keys used are :-"
 390 PROC_KLIST
 400 PRINT:PRINT"PRESS any key to conti
nue"
 410 D$=GET$
 420 ENDPROC
 430 DEF PROC_KSEND
 440 IF NXK%=0 THEN VDU 7:ENDPROC
 450 CLS:PRINTTAB(0,5)"Send IR Remote c
ontrol commands":PRINT
 460 PRINT"Keys to use are :-"
 470 PROC_KLIST
 480 PRINT:PRINT"Control and Q to end"
 490 REPEAT
 500 E$=GET$
 510 FOR B%=0 TO NXK%-1
 520 IF E$=K$(B%) THEN PROC_TX(B%)
 530 NEXT
 540 UNTIL E$=CHR$(17)
 550 ENDPROC
 560 DEF PROC_KLIST
 570 FOR A%= 0 TO NK%
 580 IF K$(A%)<>"" THEN PRINT;K$(A%);"
- ";KD$(A%)
 590 NEXT
 600 ENDPROC
 610 DEF PROC_GETK
 620 IF NXK%>NK% THEN ENDPROC
 630 PRINT"Press the remote control but
ton you want";:PRINT"to define ";
 640 PROC_READ
 650 PRINTTAB(0,20)"Press the computer
key you want to";SPC(6);
 660 PRINT"associate with this button "
;
 670 B$=GET$:PRINTB$
 680 A%=-1
 690 REPEAT
 700 A%=A%+1
 710 UNTIL K$(A%)=B$ OR A%=NK% OR K$(A%
)=""
 720 IF K$(A%)=B$ THEN PROC_CORA(A%) EL
SE NXK%=NXK%+1:K$(A%)=B$:PROC_CHANGE(A%)
 730 INPUT"What lable for this key ",KD
$(A%)
 740 ENDPROC
 750 DEF PROC_CORA(K%)
 760 LOCAL A%
 770 PRINT"Change definition or Average
 with existing C/A ";
 780 C$=GET$:PRINTC$
 790 IF C$="C" OR C$="c" THEN PROC_CHAN
GE(K%):ENDPROC
 800 FOR A%=0 TO NN%
 810 Time%(K%,A%)=(TTime%(A%)+Time%(K%,
A%))/2
 820 NEXT
 830 ENDPROC
 840 DEF PROC_CHANGE(K%)
 850 LOCAL A%
 860 FOR A%=0 TO NN%
 870 Time%(K%,A%)=TTime%(A%)
 880 NEXT
 890 ENDPROC
 900 DEF PROC_SAVE
 910 IF NXK%=0 THEN VDU 7:ENDPROC
 920 *CAT
 930 INPUT"File name for these keys ";F
$
 940 F%=OPENOUT(F$)
 950 PRINT# F%,NN%,NXK%
 960 FOR A%=0 TO NXK%-1
 970 PRINT# F%,K$(A%),KD$(A%)
 980 FOR B%=0 TO NN%
 990 PRINT# F%,Time%(A%,B%)
1000 NEXT:NEXT
1010 CLOSE#F%
1020 ENDPROC
1030 DEF PROC_LOAD
1040 *CAT
1050 INPUT"File name that holds your ke
ys ";F$
1060 F%=OPENIN(F$)
1070 INPUT#F%,X%,Y%
1080 IF X%<>NN% OR Y%>NK% THEN PRINT"In
compatable file":CLOSE#F%:D$=GET$:ENDPRO
C
1090 NXK%=Y%
1100 FOR A%=0 TO Y%-1
1110 INPUT# F%,K$(A%),KD$(A%)
1120 FOR B%=0 TO NN%
1130 INPUT# F%,Time%(A%,B%)
1140 NEXT:NEXT
1150 CLOSE#F%
1160 ENDPROC
1170 DEF PROC_TX(V%)
1180 LOCAL A%,C%
1190 A%=0
1200 FOR C%=STORE TO STORE+NN%*2 STEP 2
1210 C%?1=Time%(B%,A%) DIV 256
1220 C%?0=Time%(B%,A%) AND 255
1230 A%=A%+1
1240 NEXT
1250 FORZ%=0 TO 5
1260 CALL TX
1270 NEXT
1280 ENDPROC
1290 DEF PROC_READ
1300 CALL IR
1310 MOVE 0,150
1320 S%=0:B%=0
1330 FOR A%=STORE TO STORE+NN%*2 STEP 2
1340 T%=&FFFF-(?A%+256*(?(A%+1)))
1350 TTime%(B%)=T%
1360 B%=B%+1
1370 T%=T%/20
1380 PLOT 1,T%,0
1390 S%=S% EOR 1
1400 IF S%=0 THEN PLOT 1,0,-50 ELSE PLO
T 1,0,50
1410 NEXT
1420 ENDPROC
1430 DEF PROC_INIT
1440 FOR A%=0 TO 2 STEP 2
1450 P%=CODE%
1460 [
1470 OPT A%
1480 .IR
1490 SEI
1500 LDA &FE6B \ TIMER CONTROL REG
1510 AND #&3F:ORA #&40
1520 STA &FE6B
1530 .LPO \ HOLD UNTIL IR SENSED
1540 LDA &FE60:AND #&1
1550 BNE LPO
1560 LDX #&FE \ PLACE TO WRITE TIMING
1570 LDY #NP% \ CYCLES TO READ
1580 LDA #&FF \ SET UP T1
1590 STA &FE66:STA &FE67
1600 .CLP
1610 JSR LP \ MEASURE ONE CYCLE
1620 DEY
1630 BNE CLP
1640 CLI
1650 RTS
1660 .LP
1670 INX:INX
1680 LDA #&FF:STA &FE65
1690 .LP1
1700 LDA &FE60:AND #&1
1710 BEQ LP1
1720 LDA &FE64 \ GET LOW BYTE
1730 STA STORE,X
1740 LDA &FE65 \ HIGH BYTE
1750 STA STORE+1,X
1760 LDA #&FF
1770 STA &FE65 \ RESET T1
1780 INX:INX
1790 .LP2
1800 LDA &FE60:AND #&1
1810 BNE LP2
1820 LDA &FE64 \ GET LOW BYTE
1830 STA STORE,X
1840 LDA &FE65 \ HIGH BYTE
1850 STA STORE+1,X
1860 RTS
1870 .TX \ SEND IR
1880 SEI
1890 LDA &FE6B:AND #&3F:STA &FE6B
1900 LDA #&C0:STA &FE6E \ ENABLE T1
1910 LDY #NP% \ CYCLES TO WRITE
1920 LDX #&FE \ PLACE TO TAKE TIMING
1930 .TLP
1940 JSR TXI
1950 DEY:BNE TLP
1960 LDA #&40:STA &FE6E \ DISABLE T1
1970 CLI:RTS
1980 .TXI
1990 INX:INX
2000 LDA STORE,X
2010 STA &FE64:STA &FE66
2020 LDA STORE+1,X
2030 STA &FE67:STA &FE65
2040 LDA &FE60:ORA #2:STA &FE60
2050 .HIL LDA &FE6D:BPL HIL
2060 STA &FE6C REMOVE INTERRUPT
2070 INX:INX
2080 LDA STORE,X
2090 STA &FE64:STA &FE66
2100 LDA STORE+1,X
2110 STA &FE67:STA &FE65
2120 LDA &FE60:AND #&FD:STA &FE60
2130 .LOP LDA &FE6D:BPL LOP
2140 STA &FE6E
2150 RTS
2160 .STORE
2170 ]
2180 NEXT
2190 ENDPROC
```

Get it right ✓

```
  10 =    0 0 |  450 = C944 3 |  890 = ED0F 9 | 1330 = 9BAE 3 | 1770 =  7A4 B
  20 =    0 0 |  460 = F97B A |  900 = 1C42 E | 1340 = 17C0 3 | 1780 = 39CC 3
  30 = BA9F F |  470 = E474 2 |  910 = 13C7 B | 1350 = 87EF 0 | 1790 = E576 A
  40 = BF06 3 |  480 = 5ED6 0 |  920 = 3F94 8 | 1360 = F43E 8 | 1800 = 35E7 E
  50 = 4B94 5 |  490 = BFBA 0 |  930 = 624A 2 | 1370 = 5AFB 9 | 1810 = 22AF 3
  60 = C824 6 |  500 = BD03 0 |  940 = 87A0 E | 1380 = 6DEC 3 | 1820 = A54C 5
  70 =  182 7 |  510 = 8EF2 0 |  950 = 602E 9 | 1390 = 7645 A | 1830 = 2BF0 2
  80 = F3DB 2 |  520 = AD36 5 |  960 = 4157 E | 1400 = DA46 7 | 1840 = 967D D
  90 = AEBB 0 |  530 = 2C83 5 |  970 = 3AD0 4 | 1410 = 2C83 6 | 1850 = F9A2 4
 100 = 9F1C A |  540 =  2F6 B |  980 = F1CC 4 | 1420 = ED0F E | 1860 = 9843 5
 110 = 5C55 B |  550 = ED0F 4 |  990 = D609 E | 1430 = 5222 F | 1870 = B46E E
 120 = BFBA C |  560 = 72BA 0 | 1000 = 24BD B | 1440 = BFB0 1 | 1880 = 2C4A 4
 130 = 29FD E |  570 =  120 3 | 1010 = 574F E | 1450 = BFA1 E | 1890 = 4BCE E
 140 = 5451 3 |  580 = D2DC D | 1020 = ED0F 1 | 1460 = EB9E 5 | 1900 = EA04 4
 150 = 56C6 7 |  590 = 2C83 6 | 1030 = 42CF D | 1470 = C917 3 | 1910 = 4E38 C
 160 = CE27 5 |  600 = ED0F 4 | 1040 = 3F94 3 | 1480 = 5024 9 | 1920 = D0A1 3
 170 = 6F27 B |  610 = 9678 0 | 1050 = 7F15 3 | 1490 = 2C4A 8 | 1930 =  54E 0
 180 = 97D4 D |  620 = BC1A A | 1060 = 8F14 6 | 1500 =  7B3 6 | 1940 = 2ADC 2
 190 = 49A4 5 |  630 = C9AF 9 | 1070 = 9F22 8 | 1510 = AECF F | 1950 = 7E34 F
 200 = 6252 C |  640 = 3284 7 | 1080 = 4BEF B | 1520 =  833 2 | 1960 = 4100 9
 210 = 226C A |  650 = EC78 C | 1090 = A33A 3 | 1530 = 998B B | 1970 =  188 8
 220 = BF33 4 |  660 =  518 4 | 1100 = C50F 2 | 1540 = 35E7 F | 1980 = 49E1 B
 230 = 7A16 7 |  670 = C977 8 | 1110 = D989 F | 1550 =  2ED E | 1990 = 39CC 8
 240 = 7D55 0 |  680 = E10E 3 | 1120 = F1CC 3 | 1560 = D0A1 D | 2000 = 6168 D
 250 = FC23 4 |  690 = BFBA B | 1130 = 25A8 E | 1570 = 4E38 2 | 2010 = D611 9
 260 = C102 1 |  700 = B760 9 | 1140 = 24BD C | 1580 = 9945 E | 2020 = 1914 E
 270 = 16D8 8 |  710 = 4E92 5 | 1150 = 574F 0 | 1590 = 6683 3 | 2030 = 9E88 5
 280 = C6D9 8 |  720 = 4DE9 9 | 1160 = ED0F 1 | 1600 = C3BD 5 | 2040 = 1936 4
 290 = 17E4 7 |  730 = 36AB F | 1170 = FCBB 1 | 1610 = B438 8 | 2050 = 75DC 8
 300 = 23DC 8 |  740 = ED0F 1 | 1180 = 3168 4 | 1620 = F888 3 | 2060 = A55B 5
 310 = 1489 0 |  750 = B44A C | 1190 = 3084 0 | 1630 =  464 1 | 2070 = 39CC 8
 320 = 71C0 5 |  760 = 20BD 7 | 1200 = D34D A | 1640 = D5B1 4 | 2080 = 6168 6
 330 = A47A F |  770 = 5276 A | 1210 = 5AB4 0 | 1650 = 9843 1 | 2090 = D611 6
 340 = C102 0 |  780 = BD95 A | 1220 = F535 E | 1660 = 8F93 A | 2100 = 1914 A
 350 =  A0B 0 |  790 = A353 7 | 1230 = B760 6 | 1670 = 39CC E | 2110 = 9E88 E
 360 = ED0F 5 |  800 = 4003 F | 1240 = 2C83 F | 1680 = 96EA 2 | 2120 = 3345 4
 370 =  94B F |  810 = 8079 9 | 1250 = 4ABB B | 1690 = D515 A | 2130 = E26A 2
 380 = E469 3 |  820 = 2C83 6 | 1260 = 10DA 9 | 1700 = 35E7 0 | 2140 = 78D4 8
 390 = E474 5 |  830 = ED0F D | 1270 = 2C83 6 | 1710 = 5C32 D | 2150 = 9843 5
 400 = AB52 C |  840 = 20A2 2 | 1280 = ED0F 2 | 1720 = A54C C | 2160 = B0A1 5
 410 = CBB7 7 |  850 = 20BD C | 1290 = 3CF3 9 | 1730 = 2BF0 A | 2170 = 8B58 5
 420 = ED0F C |  860 = 4003 4 | 1300 = C4BF 8 | 1740 = 967D A | 2180 = 2C83 3
 430 = AF8C 5 |  870 = 43F4 4 | 1310 = 35B4 3 | 1750 = F9A2 3 | 2190 = ED0F 1
 440 = 13C7 3 |  880 = 2C83 2 | 1320 = 6FA6 2 | 1760 = CBD5 C |
```

Hubble, bubble

Crones or beauties? Jo Giles and Duncan Evans examine a handful of alternatives to laser and dot-matrix printers

THERE are pros and cons for each type of printer on the market – inkjet, bubblejet, laser or dot matrix – and it's no longer a simple matter of choosing the best quality or cheapest price, or even a combination of both.

Inkjet and bubblejet printers offer very good output in either monochrome or colour and the visual appeal of the printed material can be stunning. Technically bubblejets should give you slightly better results due to the way of spraying ink on to the paper – and they're quieter.

However, the running costs can be quite high, especially with the colour varieties, although third-party companies provide a more economical refill service. Colour is nice but you must ask yourself whether this facility is absolutely essential. If not, opt for a mono model.

Epson SQ-870

The quality of this impressive monochrome inkjet is superb being no different to that from a standard laser printer and the speed is over 800cps in its fastest mode. The graphics printing was also fast with excellent clarity.

The SQ-870 has 48 nozzles, is compact and not too intrusive on a desk. Continuous paper can be fed through the front or rear via a tractor feed mechanism.

The load/eject button on the control panel allows you to park the continuous feed and use single sheets. Drop a sheet into the top – or push it in to the front of the machine – and it automatically detects it and pulls it through lining up the print head at the top of the page. No fiddling with buttons or bail arms.

Product: Epson SQ-870
Price: £695
Supplier: Epson
Tel: 0442 61144

HP DeskJet 500C

The DeskJet range of inkjet printers has a deservedly high reputation with near laser quality results at a fraction of the cost of a laser printer. The 500C adds colour to the range and colour printer driver support comes from Risc Developments and Ace Computing.

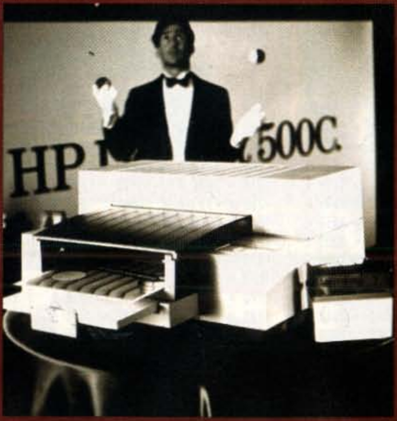
The current Risc OS 3 driver produces strong solid colours but doesn't dither properly so the final result is less than perfect but the Risc OS 2 driver is fine. Work is underway to correct the problem.

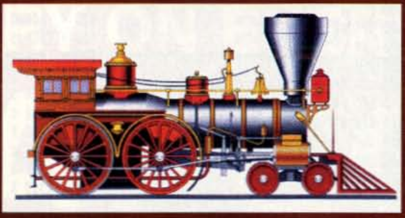
This chunky-looking machine is similar at first glance to its mono brother. The 500C can still print at 300dpi and at a fast 167cps in letter quality mode. In addition the onboard buffer has increased from 16 to 48k. The built-in sheet feeder takes up to 100 sheets with the ability to hand feed envelopes but there is no facility for continuous stationery.

Product: HP DeskJet 500C
Price: £749
Supplier: Hewlett Packard
Tel: 0344 360000

The 500C comes with a colour cartridge containing standard printing process-colour inks and can use them all at once. This means that a full colour image can be produced on one pass of the paper. The printer can use the same black-only cartridges as its predecessors for economical mono work and to use the colour capabilities you just swap the cartridges.

Printing in colour is not particularly cheap as cartridges cost £25 with a life of between 180 to 400 pages of full colour. This puts the cost at between 6p and 14p a page – just for the ink. And if you run out of one colour the whole lot is useless.





Canon BJC-800

This is a new and top-of-the-range colour bubblejet printer from market leading Canon. It is quite a large machine but setting up is straightforward as the output tray folds out of the machine and the input tray slots in the top. You can load up to 100 sheets of A4 or 50 of A3 which should be enough for most purposes.

We are told that it will also accept overhead projector transparencies as well as envelopes.

Fujitsu B200

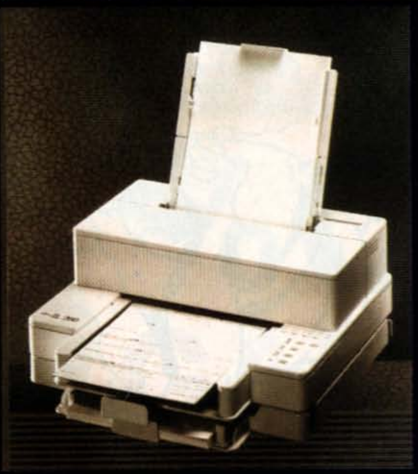
This is a reasonably compact mono inkjet printer which is simple to set up. You can print out the menu options from the printer with the instructions on altering configuration parameters.

It comes with one black ink cartridge, and prints quietly and smoothly at 300dpi. It was generous with the amount of ink it applied to the page which did lead to some bleeding but gave a solid black where required.

Cut pages are drawn into the mechanism via a 50-sheet feeder, while the output is collected in a tray at the front of the machine. It is held on a shelf first before dropping into this tray, probably to give the ink time to dry.

The finished standard of print is good and if you use high quality paper you shouldn't suffer from smudging or bleed. The paper we used was of an average quality and didn't seem to affect the performance of the other printers on test.

Product: Fujitsu B200
Price: £499
Supplier: Fujitsu
Tel: 081-573 4444



Summing up

If you are looking for a printer to use on the move, the StarJet is worth considering since it is very easy to use and produces decent graphics. If you aren't then look elsewhere because the text quality simply does not measure up to most 24-pin printers.

The Fujitsu B200 is nice and rather like a DeskJet. The output was fairly good, but there was some spreading of the ink. The Epson SQ-870 gives superb mono results and is well designed and built with excellent features.

On the colour side the HP DeskJet must take full marks but if your finances will stretch to the Canon BJC-800 – and the problem is fixed – you'll get a well-built machine producing very high quality colour output.

gives no trouble

The overall output is fast and of a high quality. Its obvious competitor is the HP Deskjet 500C which is a colour inkjet but there are differences.

Unfortunately it won't work with a Risc OS machine at present due to a serious problem with Risc OS itself. This may be cured sometime.

Canon claim that bubblejet technology is better than inkjet and in practice this does seem to be borne out as the print quality from the Canon is very slightly better. In resolution terms it is said to be 360dpi as compared to 300dpi – but you'd need to look very carefully to appreciate this.

The extra black ink cartridge definitely makes a difference as the blacks are much stronger and the separate ink cartridges mean that as one runs out you can replace it rather than having to change the whole range.

All in all a well-built colour printer that produces extremely high quality output.

Product: Canon BJC-800
Price: £1,995
Supplier: Canon
Tel: 081-773 3173

StarJet SJ-48

StarJet SJ-48
Price: £345
Supplier: Star Micronics
Tel: 0494 471111

This mono inkjet stands out from the crowd as it is portable. Able to fit easily into a briefcase it's powered by a rechargeable battery or by the mains. Aimed squarely at the portable market, it should be a nice accompaniment to the new Archimedes portable when it makes its debut. In the meantime it's very useful if you are in an environment which uses a variety of different computers that would benefit from inkjet output.

A switch on the back swaps between the battery and the very long mains adapter and lead, while others cover paper type – single sheets or envelopes – and power. The top part of the casing flips up to help feed paper, while a second flap hides the easy to install and change inkjet cartridge.

It is very flexible and can be used in a variety of ways – standing on either its base or back edge. There are three methods of paper feeding. The first is the standard friction feed method. It works fine, though the paper-out sensor gives very little leeway when positioning. Half an inch away from the prescribed feed position and the error light starts flashing. This is initially disconcerting because it doesn't look like anything is actually wrong.

The other two methods include a slot on the underside of the case feeding out of the front, and an automatic sheet feeder which connects to the underside of the case to feed through the slot. Quite bizarrely, you must turn the printer on to its rear panel, after swivelling a piece of plastic mounted there to act as support. This results in the power cable and more importantly the interface cable, sticking straight out of the side, in the air.

Yet the quality of the 48-nozzle output, while reasonable for a portable printer, is not quite as good as some of its desktop competition. The speed ranges ranges from 83 to 166 characters a second and can print up to 160 characters across the page in condensed elite mode.

One good point is that it has a 28k buffer but the printer makes a surprising amount of noise. The actual inkjet cartridge is rated to produce 700,000 characters before it needs replacing though.

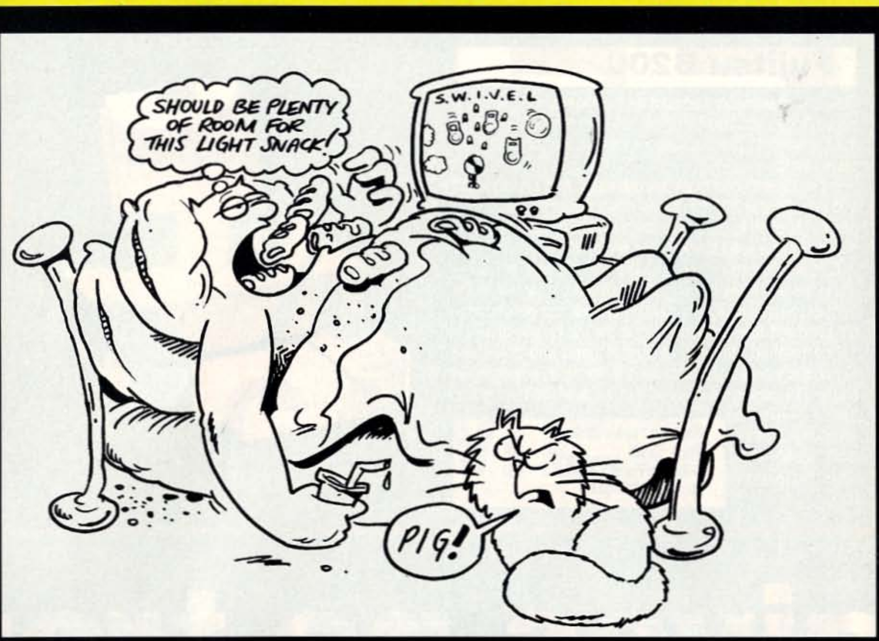
LET'S COMPUTE! Rom and Ram

WE'RE looking at animation again with a radical departure from our usual animation techniques and looking at something completely different. Ram has noticed that some frames out of a sequence of animation often differ only slightly from neighbouring frames.

Suppose we only note the difference between frames? That is, keep a record of the bits that have changed and ignore all those that remain the same.

For example, consider animating a blink on a face. Ordinarily you would draw the sprite face with its eyes open, then with the eyes shut, and then replace with the first sprite – with the eyes open.

What a waste – if you only want the eyes to blink just alter the eyes not the whole sprite. This brings us to our program this month and, although a biggy, is well worth the effort of typing in.


SHOULD BE PLENTY OF ROOM FOR THIS LIGHT SNACK!
S.W.I.V.E.L
PIG!

How it works

The program runs in Mode 4 to allow lots of memory space to store our frame data. When run it displays two boxes both 12 characters wide by 8 high. You can start immediately by drawing whatever you wish in the bottom box.

When you are happy with your first frame you can store it as a DATA line to be added to the program and it will be displayed in the top box too.

Now design your second frame and store that. As you add or erase pixels in the bottom box the contents of the top box remains the same. When a frame is saved the differences between the bottom box and the top box are noted – and that's all. No waste.

The program compares each screen memory location between both boxes and stores the memory location itself and its contents only if there's a difference. Only small alterations should be made between each frame as the program can only deal with about 20 changes per frame.

This is a self-imposed restraint because, for one thing, the data is stored in one of the function keys – which complain bitterly if you try to force gallons of information into them – and another is that you can only have about 240 characters on one Basic line.

In practice you will notice that it is possible to draw a lot more horizontally than vertically. This is because each screen memory location is 8 pixels wide but only 1 pixel deep.

For instance, a line drawn horizontally right across the box only changes the data in 12 memory locations whereas a line drawn vertically from top to bottom requires 63. The program will usually tell you if the DATA is too long and request that you erase a bit.

How to use it

Type in the listings Part1 and Part2 and ensure they're correct using the checksums and then CHAIN"PART1".

Use the usual Z, X, *, ? keys to move the cursor – the tiny dot – around the bottom box and press Return to fix a point to the screen. You can hold down Return to draw continuously if you want.

Draw something small at first – and I mean *small*, like Rom's brain or my wages – and when/if you're happy with it press D to save it.

If you've drawn too much, probably vertically, you'll get a message to erase a bit otherwise it'll say *Press Y to continue*, that's if you want to change a bit before you save it, or press Escape then f0 and f1 to save the data.

So, press Escape, then f0 and a line will appear on screen something like:

```
>5000DATA11,26813,3,26814,8,26821,248,...
```

which is adding a new data line to the program. Press f1, which is just RUN, to save typing. Now your first frame will be shown in both boxes. Add some more pixels to the bottom picture.

Press D to save again. Wait a bit...now press Escape, f0, f1. You'll soon get into the swing of it and it's possible to build up quite a pace once you get weaving.

Note that with each successive press of f0 the line number before the

DUCKAGE DUNGEON
THE DUCKS ARE PAINTING THE DUNGEON IN MODE 5 COLOURS
SPLOSH!
WHAT COLOUR'S THAT SUPPOSED TO BE?
WELL, IT'S RED WHICH IS LOGICAL COLOUR ONE
I DON'T LIKE RED, I WISH YOU'D DONE IT MAGENTA! YOU'LL HAVE TO REPAINT IT!
NO PROBLEM, I'LL SWITCH IT USING:
VDU19,1,5;0;

More movements

Mike Goldberg explores a different way of animating things

word DATA increases by 10. When you've drawn a few frames press A to animate them. If you hold down Shift while pressing A you can whip through the frames very quickly. Also you can step through the frame sequence by pressing S.

To see each frame press S each time and while you're at it you can edit a frame while in step mode.

Just keep pressing S until you arrive at the frame you want to edit then press E.

The top box will display the frame before the one you are editing but don't worry about that, go ahead and make your alterations in the bottom box. When you're happy save the frame in the normal manner.

Line drawing

There's also a line drawing facility which you can initiate by pressing L. Now when you press Z, X, *, ? a line is drawn from a fixed point. To fix the line press Return. Press Space to return to normal pixel drawing.

Note also that when you've drawn a lot of frames and you've just pressed f1 to run the program again press Shift to speed up the initial animation run through. This saves time and frustration and cuts down on those household chores.

Modifications

There are several modifications you could add to the program. To alter the animation speed, that is, the time to wait between frames alter the line:

```
TIME=0:REPEATUNTILTIME>20
```

in PROCanimate to a lower figure than 20 to speed things up. Or alter the VDU19 command near the start of the program as this changes the colour 0 to actual colour 5. The more adventurous among you could add some more drawing tools like circles (small ones) or triangles.

Finally, when you're happy with your animation you can dispense with most of the program – all you need is the animate procedure and the data. To do this just delete these lines: 30, 40, 60, 70, 100, 110, 120, 140 to 1300 inclusive, 1330, 1360, 1430, 1450, 1470, 1490 to 2050 inclusive. Then add these two lines:

```
135 END
1350 CLS
```

Now you should be left with the bare bones of the program and your saved data which should run quite happily displaying your animation. One thing that is really quite fun to do is just to save the data lines, from 5000 upwards including line 9999DATA-9. Then save those data lines with a meaningful name like *pic1* or *demo2*.

To use a separate data program with the main program here's an example of what to do right from the off, first making sure you have a copy saved of the main program on another disc. CHAIN"PART1" which then runs the main program PART2.

Now design your animation and save it to data lines as shown. Delete all the lines from 10 to the start of data at line 5000, leave 5000 in and line 9999. Now save this data with a sensible name SAVE"mydata1" So now you have a separate data program which you can load into the main program at any time like this, starting from scratch:

- CHAIN"PART1"
- Press Escape and list the main program.
- Delete line 9999.
- Type:

```
PRINT ~TOP-2
```

This will print a four-figure number *XXXX* which may contain letters as well. Now type:

```
*LOAD myprog1 XXXX
```

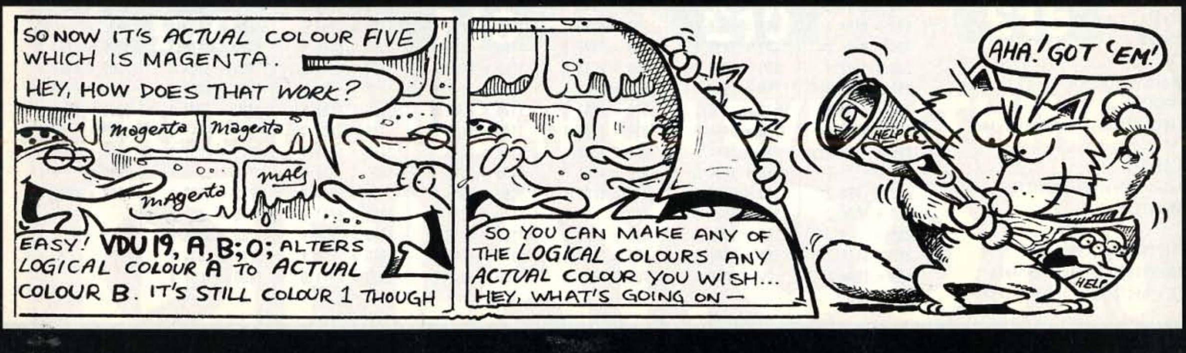
replacing *XXXX* with the number you got in the previous step. Type END and press Return. Now RUN the program. It should work perfectly well as long as your saved data has line 9999DATA-9. If not type it in yourself.

- *There are examples on this month's disc which illustrates what can be done with this program using a bit of imagination, a bit of effort and plenty of sausage rolls. Now where has Rom put my S.W.I.V.E.L. chair – I've some serious zapping to do.*

```
   10 REM > Part1
   20 FORI%=&5500 TO &57FC STEP4:!I%=0:N
EXT
   30 L%=5000
   40 PAGE=&1100:CHAIN"PART2"

   10 =    0 0
   20 = 8CBC C
   30 = B2D5 8
   40 = D4DD F
```

```
   10 REM > Part2
   20 MODE4
   30 *KEY1RUN|M
   40 *KEY5MODE6|ML.5000,9999|N|M
   50 VDU19,0,5;0;19,1,0;0;
   60 L$=STR$L%
   70 DIM ML%(120),MC%(120)
   80 HIMEM=&5500
   90 VDU23;8202;0;0;0;
  100 PROCgrid(444,608)
  110 PROCgrid(444,896)
  120 PROCinit
  130 PROCanimate
  140 PROCsave
  150 PROCdisplay
  160 PROCstart
  170 PRINTTAB(0,1)"Press D to Save DATA
"
  180 REPEAT
  190 PROCkeys
  200 UNTIL0
  210 END
  220 REM ==GRIDS
  230 DEFPROCgrid(a%,b%)
  240 GCOL0,1
  250 MOVEa%,b%
  260 PLOT1,388,0:PLOT1,0,-260:PLOT1,-38
8,0:PLOT1,0,260
  270 ENDPROC
  280 REM ==INIT
  290 DEFPROCinit
  300 M%=&5D70
  310 X%=448:Y%=604
  320 edit%=0
  330 ENDPROC
  340 REM ==START
  350 DEFPROCstart
  360 GCOL3,1:PLOT69,X%,Y%
  370 ENDPROC
  380 REM ==KEYS
  390 DEFPROCkeys
  400 IFINKEY-87GCOL0,0:PLOT69,X%,Y%:PRO
Cpen:GCOL3,1:PLOT69,X%,Y%
  410 IFINKEY-98PROCm(-4,0)
  420 IFINKEY-67PROCm(4,0)
  430 IFINKEY-73PROCm(0,4)
  440 IFINKEY-105PROCm(0,-4)
  450 IFINKEY-99PROCunfix
  460 IFINKEY-74PROCfix
  470 IFINKEY-51next%=1:FORi%=22TO29:PRI
NTTAB(0,i%)SPC40:NEXT:GCOL0,0:PLOT69,X%,
Y%:PROCnext:GCOL3,1:PLOT69,X%,Y%
  480 IFINKEY-66GCOL0,0:PLOT69,X%,Y%:PRO
Canimate:next%=1:PROCsave:PROCdisplay:GC
OL3,1:PLOT69,X%,Y%
  490 IFINKEY-82GCOL0,0:PLOT69,X%,Y%:PRO
Crun:next%=1:PROCdisplay:GCOL3,1:PLOT69,
X%,Y%:IFedit%=1PRINTTAB(0,0)"EDIT Frame
";F%;"  "
  500 next%=0
  510 ENDPROC
  520 REM ==MOVE
  530 DEFPROCm(x%,y%)
  540 IFX%+x%<448ORX%+x%>828ENDPROC
  550 IFY%+y%>604ORY%+y%<352ENDPROC
  560 GCOL3,1
  570 PLOT69,X%,Y%
  580 X%=X%+x%:Y%=Y%+y%
  590 PLOT69,X%,Y%
  600 ENDPROC
  610 REM†==FIX
```


SO NOW IT'S ACTUAL COLOUR FIVE WHICH IS MAGENTA.
HEY, HOW DOES THAT WORK?
magenta
magenta
mAgenta
mAG
EASY! VDU 19, A, B; 0; ALTERS LOGICAL COLOUR A TO ACTUAL COLOUR B. IT'S STILL COLOUR 1 THOUGH
SO YOU CAN MAKE ANY OF THE LOGICAL COLOURS ANY ACTUAL COLOUR YOU WISH... HEY, WHAT'S GOING ON –
AHA! GOT 'EM!
HELP
HELP

Rom and Ram

TAKE IT EASY

If you would like to save the wear and tear on your fingers you'll find this listing – together with all the others from this issue – on this month's disc, sent free if you subscribe to *The Micro User*

```
 620 DEFPROCfix
 630 GCOL0,1
 640 PLOT69,X%,Y%
 650 GCOL3,1
 660 PLOT69,X%,Y%
 670 ENDPROC
 680 REM ==UNFIX
 690 DEFPROCunfix
 700 GCOL1,1
 710 PLOT69,X%,Y%
 720 ENDPROC
 730 REM ==SAVE TOP PIC TO &5500
 740 DEFPROCsave
 750 store%=&5500
 760 M%=&68B0
 770 FORJ%=0TO7
 780 FORI%=0TO92STEP4
 790 I%!store%=I%!M%
 800 NEXT
 810 M%=M%+320
 820 store%=store%+96
 830 NEXT
 840 *FX21,1
 850 SOUND1,-15,90,1
 860 ENDPROC
 870 REM ==DISPLAY
 880 DEFPROCdisplay
 890 ?&57FC=0
 900 draw%=&5D70
 910 draw2%=&68B0
 920 store%=&5500
 930 FORJ%=0TO7
 940 FORI%=0TO92STEP4
 950 I%!draw%=I%!store%
 960 IFedit%=0I%!draw2%=I%!store%
 970 NEXT
 980 store%=store%+96
 990 draw%=draw%+320
 1000 draw2%=draw2%+320
 1010 NEXT
 1020 ENDPROC
 1030 REM ==NEXT FRAME
 1040 DEFPROCnext
 1050 *FX15
 1060 *FX20,0
 1070 M1%=&5D70
 1080 M2%=&68B0
 1090 data$=""
 1100 N%=0
 1110 FORJ%=0TO7
 1120 FORI%=0TO96
 1130 IFI%?M2%<>I%?M1% ML%(N%)=M2%+I%:MC
%(N%)=I%?M2%:N%=N%+1
 1140 NEXT
 1150 M1%=M1%+320
 1160 M2%=M2%+320
 1170 NEXT
 1180 IFN%=0GOTO1270
 1190 N$=STR$N%+","
 1200 PRINTTAB(0,22);N%;" changes so far
"
 1210 FORI%=0TON%-1
 1220 IFLENdata$<200data$=data$+STR$ML%(
I%)+","+STR$MC%(I%)+","
 1230 NEXT
 1240 data$=LEFT$(data$,LEN(data$)-1)
 1250 IFLENdata$>160PRINTTAB(0,2)"Data t
oo long ERASE a bit!:Press SPACE":REPEAT
UNTILGET=32:PRINTTAB(0,2)SPC39:ENDPROC
 1260 PROCfkey
 1270 PROCsave:PRINTTAB(0,1)"Press ESCAP
E then f0 to keep DATA then  f1 to RUN t
he program again":IFedit%=0PRINTTAB(0,0)
"Press  'Y' to continue...OR"
 1280 IFedit%=1edit%=0:L%=0L%:L$=STR$L%:
ENDPROC
 1290 REPEATUNTILGET=89:FORI%=0TO2:PRINT
TAB(0,I%)SPC39:NEXT:L%=L%-10
 1300 ENDPROC
 1310 REM ==ANIMATE
 1320 DEFPROCanimate
 1330 L%=5000
 1340 RESTORE
 1350 CLS:PROCgrid(444,608):PROCgrid(444
,896)
 1360 *FX15
 1370 REPEAT
 1380 READnum%:IFnum%=-9GOTO1460
 1390 FORI%=1TOnum%
 1400 READmem%,con%
 1410 ?mem%=con%
 1420 NEXT
 1430 IFINKEY-1GOTO1450
 1440 TIME=0:REPEATUNTILTIME>20
 1450 L%=L%+10
 1460 UNTILnum%=-9
 1470 PRINTTAB(0,1)"Press D to Save DATA
"
 1480 ENDPROC
 1490 REM ==STEP THROUGH FRAMES
 1500 DEFPROCrun
 1510 F%=1:FORI%=&5500 TO &57FC STEP4:!I
%=0:NEXT
 1520 *FX15
 1530 CLS:PROCgrid(444,608):PROCgrid(444
,896)
 1540 PRINTTAB(0,1)"Press S to Step thro
ugh frames"TAB(0,2)"Press E to Edit fram
e"
 1550 RESTORE
 1560 REPEAT
 1570 PRINTTAB(0,0)"FRAME No ";F%
 1580 READnum%:IFnum%=-9G=0:GOTO1690
 1590 FORI%=1TOnum%
 1600 READmem%,con%
 1610 ?mem%=con%
 1620 NEXT
 1630 *FX15
 1640 G=GET
 1650 IFG=69num%=-9:edit%=1:OL%=L%:L%=49
90+(F%*10):L$=STR$L%:GOTO1690
 1660 IFG<>83GOTO1640
 1670 PROCsave
 1680 F%=F%+1
 1690 UNTILnum%=-9
 1700 IFG=69GOTO1720
 1710 PRINTTAB(0,0)"Press SPACE":FORI%=1
TO2:PRINTTAB(0,I%)SPC39:NEXT:REPEATUNTIL
GET=32
 1720 FORI%=0TO2:PRINTTAB(0,I%)SPC39:NEX
T
 1730 PRINTTAB(0,1)"Press D to Save DATA
"
 1740 ENDPROC
 1750 REM ==LINE KEYS
 1760 DEFPROCpen
 1770 OX%=X%:OY%=Y%
 1780 REPEAT
 1790 IFINKEY-98PROCmp(-4,0)
 1800 IFINKEY-67PROCmp(4,0)
 1810 IFINKEY-73PROCmp(0,4)
 1820 IFINKEY-105PROCmp(0,-4)
 1830 IFINKEY-74PROCok
 1840 UNTILINKEY-99
 1850 ENDPROC
 1860 REM ==LINE DRAWING
 1870 DEFPROCmp(u%,v%)
 1880 GCOL3,1
 1890 MOVEX%,Y%:DRAWOX%,OY%
 1900 X%=X%+u%:Y%=Y%+v%
 1910 MOVEOX%,OY%
 1920 DRAWX%,Y%
 1930 ENDPROC
 1940 DEFPROCok
 1950 GCOL0,1:MOVEX%,Y%:DRAWOX%,OY%
 1960 MOVEX%,Y%:OX%=X%:OY%=Y%
 1970 ENDPROC
 1980 REM ==fKEY
 1990 DEFPROCfkey
 2000 LOCALX%,Y%
 2010 $&700="KEY0 "+L$+"DATA"+N$+data$+"
|M"
 2020 Y%=7:CALL&FFF7
 2030 L%=L%+10:L$=STR$L%
 2040 ENDPROC
 2050 REM ==DATA
 9999 DATA-9
```

Get it right ✓

```
  10 =    0 0
  20 = BA9F F
  30 = A989 F
  40 = 70D1 C
  50 = 8F5D 9
  60 = B6EF 1
  70 = C5FF 2
  80 = B02D E
  90 = F716 1
 100 = 9E72 3
 110 = 81B6 1
 120 = DEBB 0
 130 = 93DA C
 140 = 90DB C
 150 = 2F83 F
 160 = 9D5F B
 170 = E741 5
 180 = BFBA A
 190 = B0B6 8
 200 = 53CE 1
 210 = FD2E 3
 220 =    0 3
 230 = E9B1 E
 240 =  32F 7
 250 = 5275 C
 260 =  974 2
 270 = ED0F 2
 280 =    0 2
 290 = 344C 1
 300 = E88B A
 310 = 6BC3 D
 320 = 828C B
 330 = ED0F C
 340 =    0 C
 350 = 363B 5
 360 = 491F A
 370 = ED0F 9
 380 =    0 9
 390 = 5A41 A
 400 = 59E7 3
 410 = 3C63 D
 420 = AC8E 0
 430 = 4EF5 C
 440 = 9B37 A
 450 = CC26 C
 460 =  304 D
 470 = E73D C
 480 =  10B F
 490 = 8AB0 A
 500 = 2208 C
 510 = ED0F 1
 520 =    0 1
 530 = 6F8A 0
 540 = 7EF4 7
 550 = 148C B
 560 = 5A7F 7
 570 = 3187 0
 580 = CE0C 1
 590 = 3187 5
 600 = ED0F A
 610 =    0 A
 620 =  35B E
 630 =  32F 5
 640 = 3187 E
 650 = 5A7F 5
 660 = 3187 F
 670 = ED0F 4
 680 =    0 4
 690 = 1327 1
 700 = 341F E
 710 = 3187 F
 720 = ED0F A
 730 =    0 A
 740 = 7A2C C
 750 = E076 6
 760 = 2992 C
 770 =  64A 3
 780 = 909A 1
 790 = F476 8
 800 = 2C83 F
 810 = 6E0B 4
 820 = FEE2 2
 830 = 2C83 1
 840 = 3BBB F
 850 = 4507 7
 860 = ED0F 4
 870 =    0 4
 880 = C225 2
 890 = 1F18 E
 900 = 92CE 8
 910 = DB6B 2
 920 = E076 6
 930 =  64A 2
 940 = 909A 8
 950 = B573 B
 960 = 6EAD F
 970 = 2C83 5
 980 = FEE2 C
 990 =  43B 1
1000 =  192 A
1010 = 2C83 3
1020 = ED0F 5
1030 =    0 5
1040 = A5D2 3
1050 = A022 2
1060 = 1CAA 5
1070 = 48DA 4
1080 = 41B6 D
1090 = 67F1 4
1100 = E46A C
1110 =  64A B
1120 = 87DE 6
1130 = E4BD C
1140 = 2C83 1
1150 = FB2A 4
1160 = 8405 5
1170 = 2C83 4
1180 = 215B 4
1190 = 89DE 5
1200 = A1F9 2
1210 = F71F 8
1220 = 72C7 1
1230 = 2C83 7
1240 = E6A7 5
1250 = A6E8 E
1260 = 7565 8
1270 = A642 E
1280 = 8D4C C
1290 = 5F0B 2
1300 = ED0F 3
1310 =    0 3
1320 = 7E7C D
1330 = B2D5 B
1340 = 9FF8 E
1350 = CF5C 4
1360 = A022 7
1370 = BFBA 4
1380 = C765 3
1390 = 8446 6
1400 = 6C5A 0
1410 = B301 7
1420 = 2C83 A
1430 = 1A63 7
1440 = DC69 1
1450 = F671 7
1460 = 7F7F C
1470 = E741 F
1480 = ED0F F
1490 =    0 F
1500 = A811 0
1510 = F8CD E
1520 = A022 7
1530 = CF5C 0
1540 = 846D 2
1550 = 9FF8 9
1560 = BFBA C
1570 = 59A9 A
1580 =  29B 8
1590 = 8446 4
1600 = 6C5A 3
1610 = B301 9
1620 = 2C83 7
1630 = A022 5
1640 =  EBB 8
1650 = D9E2 F
1660 =  5C2 6
1670 = 90DB C
1680 = FF09 C
1690 = 7F7F 3
1700 = 830A 7
1710 = 4963 8
1720 = 7D7B D
1730 = E741 6
1740 = ED0F 1
1750 =    0 1
1760 = C502 A
1770 =  E61 2
1780 = BFBA 0
1790 = A604 1
1800 = AC07 A
1810 = 5998 C
1820 = 8F7D B
1830 = 6E89 6
1840 =  F23 F
1850 = ED0F 5
1860 =    0 5
1870 = CE4E 7
1880 = 5A7F 1
1890 = A07E 5
1900 = F5B2 C
1910 = E9BE A
1920 = CEE4 3
1930 = ED0F 4
1940 = DA6E F
1950 = BE07 3
1960 = F0A8 B
1970 = ED0F 6
1980 =    0 6
1990 = 9F92 C
2000 = A269 4
2010 = C218 D
2020 = FAD6 B
2030 = 92AD 6
2040 = ED0F F
2050 =    0 F
9999 = C735 4
```

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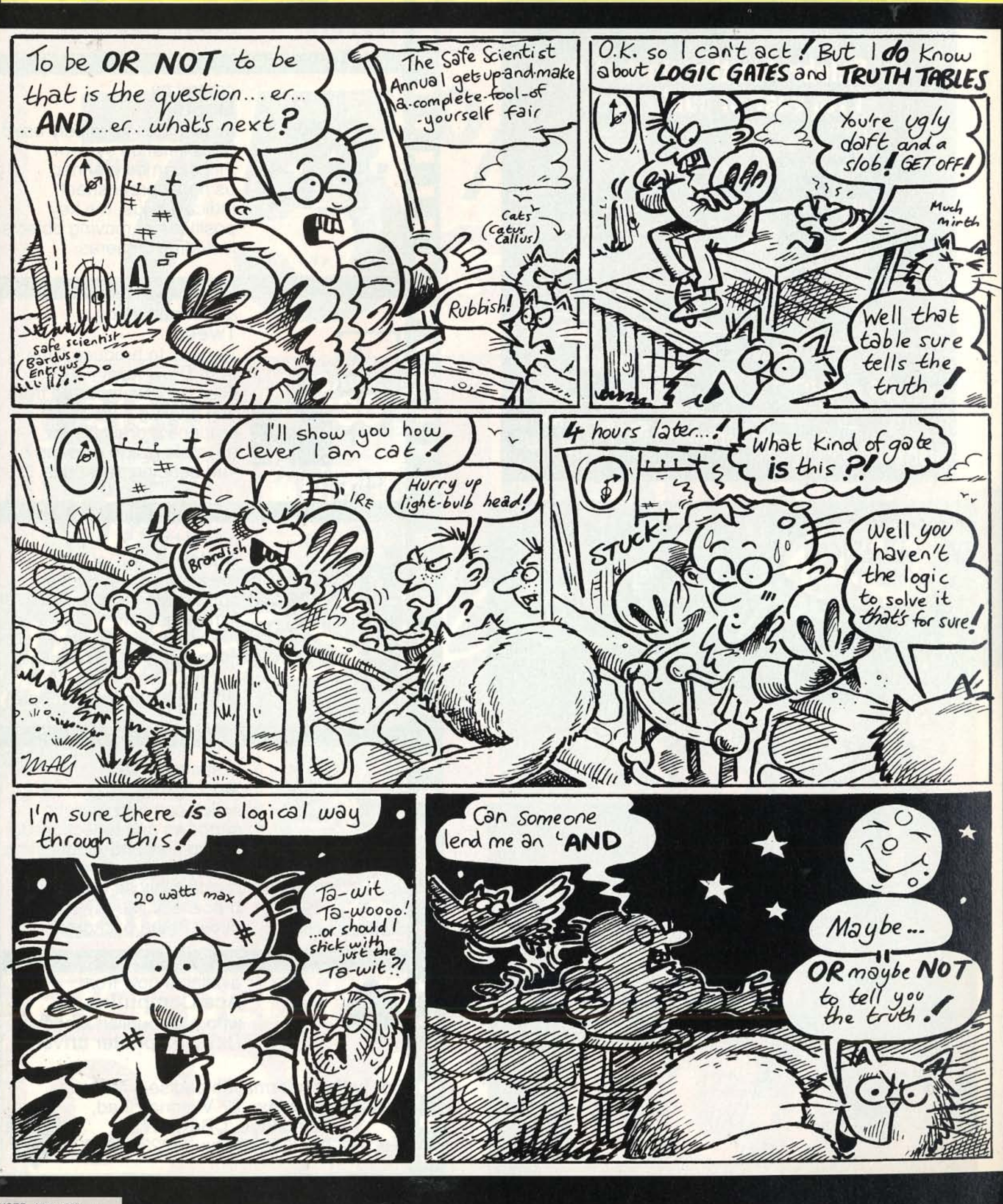
The Safe

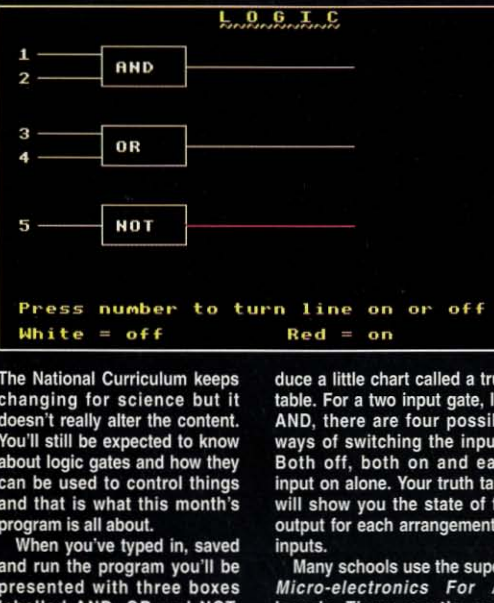

To be **OR NOT** to be that is the question... er... ..**AND**...er...what's next?
The Safe Scientist Annual get-up-and-make a-complete-fool-of -yourself fair
Cats (Catus Callus)
Rubbish!
Safe scientist (Bardus Entryus)
O.K. so I can't act! But I **do** know about **LOGIC GATES** and **TRUTH TABLES**
You're ugly daft and a slob! GET OFF!
Much mirth
Well that table sure tells the truth!
I'll show you how clever I am cat!
IRE
Hurry up light-bulb head!
Brandish
?
MAL
4 hours later...!
What kind of gate **is** this?!
STUCK!
Well you haven't the logic to solve it that's for sure!
I'm sure there **is** a logical way through this!
20 watts max
Ta-wit Ta-woooo! ...or should I stick with just the Ta-wit?!
Can someone lend me an '**AND**
Maybe...
OR maybe **NOT** to tell you the truth!

Scientist

LET'S COMPUTE!

A logical conclusion

Can't decide whether to read on or not? Well this time we'll be making some fairly crucial decisions concerning logic



```
L O G I C
Press number to turn line on or off
White = off           Red = on
```

The National Curriculum keeps changing for science but it doesn't really alter the content. You'll still be expected to know about logic gates and how they can be used to control things and that is what this month's program is all about.

When you've typed in, saved and run the program you'll be presented with three boxes labelled AND, OR and NOT. They each have input wires entering on the left hand side and an output wire leaving on the right. Your task is to find out what you must do to the input wires in order to get an output.

To start, all the inputs are turned off and are displayed in white. Hit the number shown by an input and it will be turned on and shown red. Has the output gone red as well? If you wish to turn an input off just tap its number again.

Ideally, you should try to produce a little chart called a truth table. For a two input gate, like AND, there are four possible ways of switching the inputs: Both off, both on and each input on alone. Your truth table will show you the state of the output for each arrangement of inputs.

Many schools use the superb *Micro-electronics For All* boards. These use the same three logic gates and allow them to be operated by light or heat and will switch on buzzers or bulbs. With luck, you may get a chance to use these but if not, you could add sound or light to this program. If you were really clever, you might be able to use the output from one logic gate to be the input for another.

- *That just about wraps it up for this month. Don't forget to be logical when making decisions. Next time we'll look into the world of balancing levers.*

```
   10 REM LOGIC GATES
   20 REM The Safe Scientist
   30 REM (c) The Micro User
   40 MODE1:PROCinit:PROCinstruct:REPEAT
PROCinputs:UNTIL0:END
   50 DEFPROCinit:on%=TRUE:off%=FALSE
   60 DIM input%(5),output%(3)
   70 PROCand:PROCor:PROCnot:ENDPROC
   80 DEFPROCand
   90 PROCbox(7,200,800,400,900,"AND")
  100 PROCsetInput(1,off%)
  110 PROCsetInput(2,off%)
  120 PROCevalAnd:ENDPROC
  130 DEFPROCor
  140 PROCbox(7,200,600,400,700,"OR")
  150 PROCsetInput(3,off%)
  160 PROCsetInput(4,off%)
  170 PROCevalOr:ENDPROC
  180 DEFPROCnot
  190 PROCbox(7,200,400,400,500,"NOT")
  200 PROCsetInput(5,off%)
  210 PROCevalNot:ENDPROC
  220 DEFPROCbox(C%,U%,V%,X%,Y%,t$)GCOLO
,C%
  230 MOVEU%,V%:DRAWU%,Y%:DRAWX%,Y%:DRAW
X%,V%:DRAWU%,V%
  240 VDU5:MOVEU%+32,V%-(V%-Y%)/2+12:PRI
NTt$;:PROCvdu4
  250 ENDPROC
  260 DEFPROCsetInput(N%,O%)input%(N%)=O
%:PROCdrawInput(N%):ENDPROC
  270 DEFPROCdrawInput(N%)LOCALY%:GCOLO,
FNc(input%(N%)):Y%=FNiy(N%)
  280 MOVE50,Y%:DRAW200,Y%:VDU5:MOVE0,Y%
+12:PRINT;N%;:PROCvdu4:ENDPROC
  290 DEFFNiy(N%)
  300 IF N%=1 =880
  310 IF N%=2 =820
  320 IF N%=3 =680
  330 IF N%=4 =620
  340 IF N%=5 =450
  350 DEFPROCevalAnd
  360 output%(1)=input%(1) AND input%(2)
  370 PROCdrawOutput(1):ENDPROC
  380 DEFPROCevalOr
  390 output%(2)=input%(3) OR input%(4)
  400 PROCdrawOutput(2):ENDPROC
  410 DEFPROCevalNot
  420 output%(3)=NOT input%(5)
  430 PROCdrawOutput(3):ENDPROC
  440 DEFFNoy(N%)
  450 IF N%=1 =850
  460 IF N%=2 =650
  470 IF N%=3 =450
  480 DEFPROCdrawOutput(N%)LOCALY%:GCOLO
,FNc(output%(N%))
  490 Y%=FNoy(N%):MOVE400,Y%:DRAW800,Y%:
ENDPROC
  500 DEFFNc(O%)IFO%:=1ELSE=3
  510 DEFPROCinputs
  520 REPEAT G%=INSTR("12345",GET$):UNTI
L G%>0
  530 PROCsetInput(G%,NOT input%(G%))
  540 IF G%>4 PROCevalNot ELSEIF G%>2 PR
OCevalOr ELSE PROCevalAnd
  550 ENDPROC
  560 DEFPROCinstruct:VDU23,1,0;0;0;0;
:COLOUR2
  570 PRINTTAB(15,1)"L O G I C"TAB(15)"
---------"
  580 PRINTTAB(0,24)"Press number to tur
n line on or off"
  590 PRINT'"White = off"TAB(20)"Red = o
n":ENDPROC
  600 DEFPROCvdu4:VDU4:VDU23,1,0;0;0;0;:
ENDPROC
```

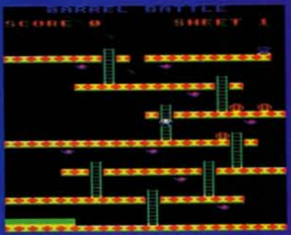
Get it right ✓

```
 10 =    0 0      160 =  7E6 1      310 = 5BFD 0      460 = D96B 2
 20 =    0 0      170 = B148 B      320 = EA97 2      470 = F2AB 0
 30 =    0 0      180 = C1D0 1      330 = CD1D 1      480 = 5038 F
 40 =  823 3      190 = B6D0 8      340 = 7F4A B      490 = 84B2 D
 50 = E07F C      200 = BF87 4      350 = A6BA D      500 = 8ECB E
 60 = F408 8      210 = 55F4 4      360 =  5AC 9      510 = 1590 4
 70 = CF80 2      220 = 554F 5      370 = 11F2 6      520 = 1A41 B
 80 = CCE1 4      230 = ACE8 5      380 = 61AB 8      530 = 3F05 8
 90 =   48 8      240 = DED1 F      390 = 518A 0      540 = B6A3 C
100 = 7E41 4      250 = ED0F A      400 = 8A2E D      550 = ED0F 0
110 = A6C3 B      260 = B5BD 9      410 = AB8B 2      560 = B250 B
120 =  5DA A      270 = B492 E      420 = 68AE A      570 = 9F25 3
130 = 5976 1      280 = 2ED7 9      430 = FC9A 9      580 = B339 E
140 = 771D 3      290 = 3E31 3      440 = B3D0 C      590 = 1DD6 2
150 = 1EA2 2      300 = 7AD6 6      450 =  C8A A      600 = 18A3 3
```

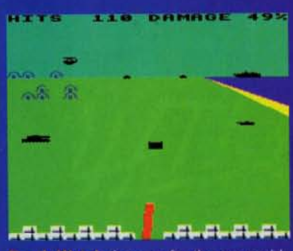
Collect the games that made history

This is what your disc will contain

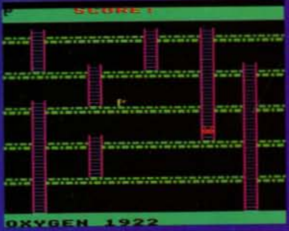
Air Strike Test your skill over three levels of surface-skimming flying, taking out air bases and destroying aliens. Fast, furious and a little tricky. *May 1983*



Barrel Battle A fun game to keep you amused for hours. Collect the teapots, climb the ladders and avoid the barrels rolling down the levels. *January 1984*

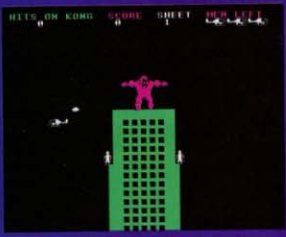


Death Watch A game for the paranoid. Attacked from land, sea and air you must defend your position by efficient use of the cannon. *March 1983*



Fruitie The fruit patch is filled with nasties which follow you through levels and up ladders. Your only defence is how fast you can dig. *August 1983,*

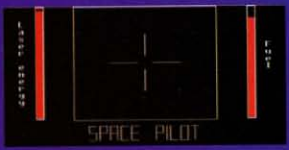
Goblins Armed with five magic coins you must find your way around a maze of trees, avoiding and destroying the deadly goblins. *November 1983*



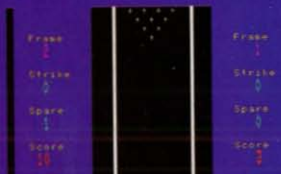
King Kong The classic villain has kidnapped two girls and once again sits astride the Empire State Building. Can you avoid the falling boulders and rescue the girls? *April 1983*

Robin Hood Meet the Sheriff in this version of the classic love story. Firing arrows at the baddies creates a ladder to rescue Marion. *September 1983*

Space Pod A new threat from outer space. These creatures will eat your base unless killed with the lasers. A simple and finger-aching version of Space Invaders. *July 1983*



Space Pilot A sophisticated and polished space game. Sharp shooting, docking and landing on planets all need a keen eye and precise positioning. *June 1983*



Ten Pin Go down the alley but keep out of the gulley in this computer version of 10-pin bowling. But it's not quite as simple as it seems. *July 1983*

A unique selection of classic games charting the history of the original BBC Micro

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GPO Poser

Roger Frost challenges you to get the mail through

IN this great little puzzler you take the role of a postman delivering letters to a row of houses. You've got a letter for each house but you don't know who lives where. It ought to be easy but the letters only have names on them – there's no address.

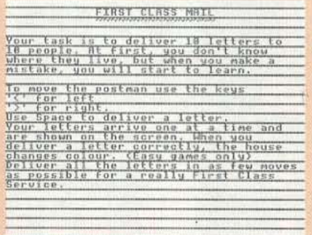
So, you pull an envelope from your sack and offer it at a house, where a servant will give you a bit of help. He tells you who lives in the house you've called at and how far away the intended receiver of the letter lives. Put back the letter, pull out another and try elsewhere.

Eventually, you'll have got all 10 letters to the correct home and you'll get a score and a time and, perhaps, a chance to enter your name on the low score table.

There are two levels to the game. In the easy version the houses change colour when you successfully deliver a letter. In the hard variant it is all down to your memory.

So, type in the listing, ensure you've made no keying mistakes using the checksums and see whether you can run a first class mail service.

```
   10 REM > <BasicSave$dir>.Postie
   20 REM By Rog Frost
   30 REM (c) The Micro User
   40 MODE6:PROCoff:*FX11
   50 ON ERROR MODE6:REPORT:PRINT" at li
ne ";ERL:END
   60 PROCinstruct:PROCinit:REPEATMODE6:
PROCoff:PROClo:MODE1:PROCoff
   70 PROCscreen:PROCsetup:PROCgame:PROC
gameover:UNTIL0:END
   80 DEFPROCoff:VDU23,1,0;0;0;0;:ENDPRO
C
   90 DEFPROCinstruct:VDU19,0,4;0;
  100 PRINTTAB(12,1)"FIRST CLASS MAIL"TA
B(12,2)"~~~~~~~~~~~~~~~~"
  110 PRINT'"Your task is to deliver 10
letters to"'"10 people. At first, you do
n't know"'"where they live, but when you
 make a"'"mistake, you will start to lea
rn."
  120 PRINT'"To move the postman use the
 keys"'"'<' for left"'"'>' for right."'"
Use Space to deliver a letter."
  130 PRINT"Your letters arrive one at a
 time and"'"are shown on the screen. Whe
n you"'"deliver a letter correctly, the
house"'"changes colour. (Easy games only
)"
  140 PRINT"Deliver all the letters in a
s few moves as possible for a really Fir
st Class"'"Service."
  150 PROCtune:PRINT''"Press Space to co
ntinue":REPEATUNTILGET=32:ENDPROC
  160 DEFPROCinit:RESTORE180:DIMn$(10),h
%(11),d%(10),lo%(8),ln$(8),t%(8)
  170 FORN%=1TO10:READn$(N%):NEXT
  180 DATAMaggie T,John M,Neil K,Paddy A
,Dr David O,Kenneth B,Roy H,Norman L,Ton
y B,Douglas H
  190 FOR N%=1TO8:lo%(N%)=100:ln$(N%)="P
ostman Pat":t%(N%)=100:NEXT:ENDPROC
  200 DEFPROCsetup:so$="ABCDEFGHIJ":FORN
%=1TO10:h%(N%)=0:d%(N%)=0:NEXT
  210 st$="":FORN%=1TOLEN(so$):p%=RND(LE
Nso$):a$=MID$(so$,p%,1)
  220 st$=st$+a$:so$=LEFT$(so$,p%-1)+RIG
HT$(so$,LEN(so$)-p%):NEXT
  230 FORN%=1TO10:h%(N%)=ASCMID$(st$,N%)
-64:NEXT:score%=0:X%=140:T%=0:go%=0
  240 VDU23,230,60,60,24,255,189,60,36,1
95:ENDPROC
  250 DEFPROCgame:REPEATREPEATno%=RND(10
):UNTILd%(no%)<>no%:go%=go%+1:TIME=0
  260 COLOUR131:COLOUR0:PRINTTAB(10,21)S
PC(10)TAB(10,21)n$(no%):COLOUR128
  270 COLOUR3:PROCmove:T%=T%+TIME:VDU28,
24,31,39,18:CLS
  280 IF w%=h%(no%) PRINT"Well done":sco
re%=score%+1:d%(no%)=no%:PROCfanfare:PRO
Chouse(w%*110,H%):GOTO330
  290 N%=0:REPEATN%=N%+1:UNTILh%(N%)=w%
OR N%>10:IF N%>10 GOTO330
  300 COLOUR3
  310 PRINT"House ";w%''"belongs to":COL
OUR129:COLOUR2:PRINT'n$(N%)
  320 PRINT'"You wanted a"''"house ";:CO
LOUR129:COLOUR2:PRINT;ABS(w%-h%(no%)):CO
LOUR128:COLOUR3:PRINT'"doors away."
  330 VDU26:UNTILscore%=10:ENDPROC
  340 DEFPROCgameover:T%=T%/100
  350 CLS:PRINT'''"You took ";go%;" move
s in ";T%;" seconds.":go%=go%*H%
  360 IFH%=2PRINT'"Your score is doubled
 because you"''"selected an easy game."
  370 PROCtune:IF go%<lo%(8) GOTO390
  380 IF go%=lo%(8)AND T%<t%(8) GOTO390
ELSE PROCw(500):ENDPROC
  390 INPUT'''"Your score is in the top
eight"''''"Please enter your name",n$
  400 PROCposition:ENDPROC
```



FIRST CLASS MAIL

Your task is to deliver 10 letters to
10 people. At first, you don't know
where they live, but when you make a
mistake, you will start to learn.

To move the postman use the keys
'<' for left
'>' for right.
Use Space to deliver a letter.
Your letters arrive one at a time and
are shown on the screen. When you
deliver a letter correctly, the house
changes colour. (Easy games only)
Deliver all the letters in as few moves
as possible for a really First Class
Service.

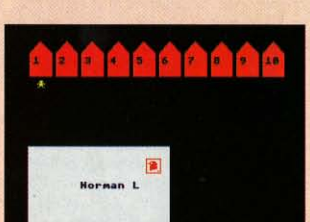
Getting started

```
  410 DEFPROCscreen:FORN%=1TO10:PROChous
e(N%*110,1):NEXT:PROCletter:ENDPROC
  420 DEFPROChouse(N%,C%)GCOL0,C%:MOVEN%
,800:MOVEN%+90,800:PLOT85,N%,900
  430 PLOT85,N%+90,900:PLOT85,N%+45,950:
VDU5:GCOL0,0:MOVEN%+10,880:PRINT;N%/110
  440 VDU4:GCOL0,1:ENDPROC
  450 DEFPROCletter:GCOL0,3:MOVE100,100:
DRAW100,500:PLOT85,700,100
```

TAKE IT EASY

If you would like to save the wear and tear on your fingers you'll find this listing – together with all the others from this issue – on this month's disc, sent free if you subscribe to *The Micro User*

```
  460 PLOT85,700,500:GCOL0,1:VDU23,224,2
55,128,128,135,137,185,143,135
  470 VDU23,225,255,1,1,193,225,241,241,
225,23,227,241,241,241,193,1,13,1,255
  480 VDU23,226,143,143,143,143,140,128,
128,255
  490 VDU5:MOVE600,450:VDU224,225,8,8,10
,226,227,4:ENDPROC
  500 DEFPROCmove:VDU5:REPEATox%=X%
  510 IF INKEY-103X%=X%-40ELSEIF INKEY-1
04X%=X%+40
  520 IF X%<140 X%=140 ELSE IF X%>1140 X
%=1140
  530 GCOL0,0:MOVEox%,780:VDU230:GCOL0,2
:MOVEX%,780:VDU230
  540 PROCw(5):UNTILINKEY(0)=32:VDU4:*FX
15
  550 w%=X%DIV110:ENDPROC
  560 DEFPROCw(T%)T%=TIME+T%:REPEATUNTIL
TIME>T%:ENDPROC
  570 DEFPROClo:VDU19,0,4;0;
  580 PRINTTAB(14,1)"BEST POSTMEN"TAB(14
,2)"~~~~~~~~~~~~"
  590 PRINTTAB(3,4)"NAMES"TAB(20,4)"SCOR
ES"TAB(30,4)"TIMES"
  600 FORN%=1TO8
  610 PRINTTAB(3,N%*2+4)ln$(N%)TAB(20,N%
*2+4);lo%(N%)TAB(30,N%*2+4);t%(N%)
  620 NEXT:PROClevel:ENDPROC
  630 DEFPROCtimesort:R%=so%-1:REPEATR%=
R%+1:UNTILT%<=t%(R%)ORlo%(R%)<>go%
  640 so%=R%:ENDPROC
  650 DEFPROCposition:so%=0
  660 REPEATso%=so%+1:UNTILgo%<=lo%(so%)
:IF go%=lo%(so%) PROCtimesort
  670 IF so%<8 FORsw%=8TOso%+1STEP-1:lo%
(sw%)=lo%(sw%-1):ln$(sw%)=ln$(sw%-1):t%(
sw%)=t%(sw%-1):NEXT
  680 lo%(so%)=go%:ln$(so%)=n$:t%(so%)=T
%:ENDPROC
  690 DEFPROCfanfare:IF w%=10 PROCpm:END
PROC
  700 FORp%=100TO200STEP4:SOUND1,-15,p%,
1:PROCw(5):NEXT:ENDPROC
  710 DEFPROCtune:LOCALn%,p%,d%
  720 RESTORE750:FORn%=1TO18:READ p%,d%:
SOUND1,-15,p%,d%:PROCw(d%*4):NEXT
  730 SOUND1,0,0,7:FORn%=1TO3:READp%,d%:
SOUND1,-15,p%,d%:PROCw(d%*4):NEXT
  740 ENDPROC
  750 DATA120,3,156,7,156,3,156,3,148,7,
136,7,140,11,120,3,120,7,120,7,128,11,13
6,3,140,3,136,3,128,6,136,11,140,4,140,1
1,108,15,120,15,92,15
  760 DEFPROClevel
  770 REPEATCOLOUR129:COLOUR0:INPUTTAB(0
,22)SPC(80)TAB(0,22)"Select level of dif
ficulty."'"(1 for hard or 2 for easy) ",
H%:UNTILH%>0 AND H%<3:ENDPROC
  780 DEFPROCpm:LOCALn%,p%,d%:RESTORE800
  790 FORn%=1TO6:READp%,d%:SOUND1,-15,p%
,d%:PROCw(10):NEXT:ENDPROC
  800 DATA100,3,116,3,128,3,148,5,144,2,
148,8
```

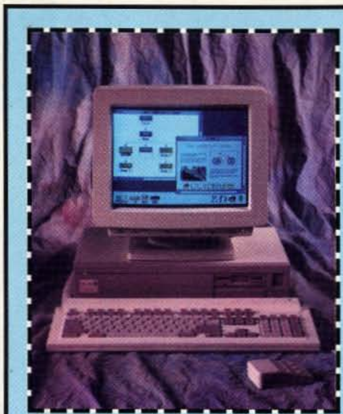


Where's number 11?

Get it right ✓

```
 10 =    0 0   170 = D45A 1   330 = 9BF5 B   490 = 25E5 D   650 = CFB9 4
 20 =    0 0   180 =  D79 4   340 = A5D7 3   500 = 4453 D   660 = A47A 7
 30 =    0 0   190 = 3497 7   350 = C363 E   510 = 5136 6   670 = FF4D 1
 40 = 7A79 9   200 = 7552 2   360 = B1E5 5   520 = 7B43 E   680 = B844 6
 50 = 8998 C   210 = B02F E   370 = 7AB0 8   530 = 5467 7   690 = A1EA 8
 60 = E9C2 A   220 = 9861 C   380 = DCB7 E   540 = 86CD 9   700 = AA3E B
 70 = FD13 9   230 = F652 6   390 = 14EC D   550 = AE1A 1   710 = 6B0E B
 80 = C94B 5   240 = 7E0F 9   400 = 354E D   560 = 3F5D 8   720 = 306E 8
 90 = 7B8F D   250 = 2860 F   410 = 4057 A   570 = EF9E E   730 = 710F 9
100 = 85E7 6   260 = 6D49 5   420 = 944D D   580 = 9F2C 0   740 = ED0F 9
110 = 9E2C 5   270 = 2EBB 6   430 = 1B65 1   590 = 3D73 3   750 = 2487 E
120 = 7085 C   280 = 1917 F   440 = BB3E A   600 = C634 4   760 = F5A5 F
130 = C774 B   290 = DDE3 F   450 = 92F6 B   610 = E12D 2   770 = 8776 C
140 = 35FE D   300 = C90B F   460 = 3BE5 5   620 = DF0E A   780 = FC54 5
150 = F551 0   310 = E1E1 F   470 = F814 B   630 = 6381 6   790 = E73C B
160 = 3547 E   320 = 7496 F   480 = 4F85 3   640 = E823 0   800 = 8B70 6
```

smart computers are in SHEFFIELD!!!



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ArcFS
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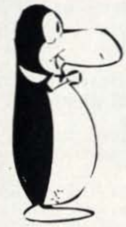
Banish Those Jaggy Blues !



Disc 35 Trace

- Trace converts Sprites into Draw files.
- Sprite format clip art is cheap and plentiful. Draw clip art is expensive and usually has to be painstakingly drawn by hand.
- Sprites take up lots of valuable disc space. Draw files are smaller.
- Scaled Sprites have jagged edges.
- Unlike some trace programs, Trace will work with full colour sprites.
- You can now use the powerful tools in Draw for manipulating Sprites.

Comes with D2Font program for making outline fonts from Draw files. So you can scan your own fonts. Cost £5.99 inclusive.

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Each pack consists of three discs filled with good quality black and white Sprites for use in DTP. The files are compressed using Spark so many 100's of pictures and Mb. come in each pack.
Pack #1: Decorative alphabets. Anatomy. Animals. Astrology. Books. Stylish pieces of text. Pointers-hands and arrows. Outlines for cards.
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Product: ADC, DAC & Digital Podules
Price: Digital Podule £150, Standard ADC/DAC £617, High Speed ADC/DAC £852
Supplier: Si-Plan Electronics Research, Avenue Farm Industrial Estate, Birmingham Road, Stratford-upon-Avon, Warwickshire CV37 0HR.
Tel: 0789 205849
Requirements: Risc OS

High-spec handshaking

Mike Cook looks at the Si-Plan solution to serious data acquisition

As readers will know my special interest is getting information into and out of computers, so I was especially keen to get my hands on Si-Plan's range of data acquisition podules. Three of these are currently on offer and Si-Plan can also customise them for you if you have special requirements.

Let's kick off with the Digital Podule. This consists of two 6522 VIAs with support software on eprom and a few interface chips. It is built on a half-width podule with a 25-way D-type plug and socket on the back to allow for user connections.

Input/output

These two connectors are labelled *Inputs* (plug) and *Outputs* (socket) although there is no buffering of the VIAs and so you could program them to be either. However, the support software treats the VIAs as a single 16-bit input port and a single 16-bit output port. An handy feature of these connectors is that 5 volts is available for powering other equipment.

Eleven new SWIs are supplied by the support software which allows you to read and write all 16 bits at once or just access single bits. You can set, clear or toggle individual bits as well as peek and poke individual hardware addresses.

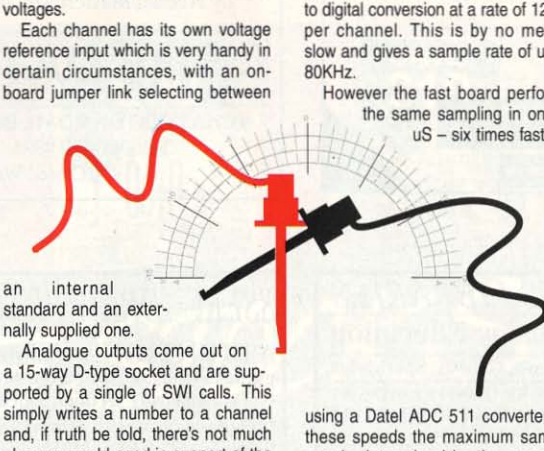
This final feature will allow you to access the timers and shift register inside the VIAs. However, you are on your own here, as there is no support for those operations.

Moving up to the two analogue boards, these are supplied as full width podules chocked full of chips. They have the same digital input/output capacity as the simpler digital podule, only this time it is handled by one VIA.

This is used for the outputs – the inputs are connected directly to the podule's data bus. Also, on these more expensive boards the inputs and outputs are buffered. One disadvantage of this is that they can't be reprogrammed.

Both boards supply four analogue output channels with a resolution of 12-bits. Each channel has its own output amplifier with pre-calibrated helical ports controlling offset and gain. The standard system comes with these set up to give +/- 10 volts although they can be set for lower voltages.

Each channel has its own voltage reference input which is very handy in certain circumstances, with an on-board jumper link selecting between an internal standard and an externally supplied one.



Analogue outputs come out on a 15-way D-type socket and are supported by a single of SWI calls. This simply writes a number to a channel and, if truth be told, there's not much else you would need in support of the output.

However, they have arranged the software so that the value is on the 12 most significant bits of a 16-bit word. This will allow future hardware to have a 16-bit D/A converter and retain software compatibility.

Differential outputs

On the input side a single 12-bit A/D converter is fed by 16 channels. As you might expect on a top of the range board, each channel has a differential input scaled to +/- 10 volts. Other voltages can be supplied on request like +/- 1 volt or even down in the millivolt range. The inputs are wired to a 37-way D-type plug and you can even get +/- 12 volts out of it for powering other equipment.

A feature not found on cheaper boards is the high-speed sample and hold circuit on each channel. This allows the board to accurately sample signals that are changing much faster than the digitising time.

This brings me on to the difference between the two boards, the sample time. The standard board offers an AD674 chip performing the analogue to digital conversion at a rate of 12 uS per channel. This is by no means slow and gives a sample rate of up to 80KHz.

However the fast board performs the same sampling in only 2 uS – six times faster – using a Datel ADC 511 converter. At these speeds the maximum sample rate is determined by the speed of your computer and its software. The two podules use different circuit boards so there is no way you can perform a do-it-yourself upgrade.

Software support for the input side is quite comprehensive. As well as being able to read any channel and scan in all channels you can operate the sample and hold circuitry. For example, a Track command switches the inputs straight through to the converter while a Hold command freezes the analogue value for later conversion.

One very useful set of commands are those to log data automatically while the computer is getting on with something else. You specify a time between samples and an interrupt routine ensures the samples are taken and recorded at your defined interval. You also have access to the program trimmers used for the logging.

Finally, for the real hard nuts there is a command to put the ADC code in the fast interrupt area so you can customise your own extremely fast logging applications.

All the boards are extremely well built and are constructed to the highest standards as you would expect from a top of the range system. Si-Plan also supplied me with a disc full of software goodies like data loggers and FFT routines illustrating the use of the podules.

When I spoke to them they were very friendly and helpful. However I suspect I would not have had to trouble them at all if the documentation was better. For example nowhere in the User Guide was a mention of the resolution or acquisition speed. Apparently you are supposed to get that from the advertisement. It seems a shame to let down such an excellent set of hardware boards with such documentation.

One point I did notice is that you can't have more than one of these boards running in your computer at any one time. This is because the support software is the same for all boards and the poor old computer gets confused.

I am assured by Si-Plan that they can customise the software to allow users to operate multiple boards if they wish. However with the large capability of the podules it will only be the most complex of projects that would need more than one board.

Summing up

These boards are intended for serious data acquisition and as such they are well built and operate to the highest specification. By providing sample, hold and differential inputs they ensure that virtually all tasks are catered for.

However, for some requirements this is overkill and will add to the overall cost. These boards are already being used in medical research and in University departments and represent perhaps the only data acquisition board you would need to buy.

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Icing on your cake

Ram home some more Basic memory with Stephen Wade's help

ALL Acorn micros are blessed with a generous number of display modes – particularly the 32-bit members. They provide several different environments, comprising either graphics or text-only capability, a varying number of displayed pixels/characters and colours.

However, on the 8-bit micros in particular, they use a large amount of memory – particularly if several colours are needed. This means the greater the number of facilities used, the less the amount of space available for the program to exploit them.

Extra modes

The three programs here use some fancy variable poking to provide one solution to the problem. Between them, three new pseudo-screen modes are generated – called *A*, *B* and *C* to avoid confusion with 32-bit modes.

Although two of the three are text only, the one that permits graphics does so in 16 colours – and requires just 10k of ram. It is in theory the top half of a Mode 2 screen stretched to fill the whole area. The table summarises the characteristics of each mode.

Mode *A* is useful where 16-colour graphics are required while *B* and *C* add colour text-only modes in just 8k. Although all these screen modes use more than teletext Mode 7, they are compatible with the full range of 8-bit micros – including the Electron. This gives them increased value, as software designed to be bright and colourful on the whole 8-bit range is possible without a separate version being needed for the Electron market.

The osbyte command –*FX 154– is used to echo certain of this information to the operating system and addresses register zero of the Video ULA. Additionally, it updates the contents of location &248 – one of the main system variables.

Alternative solutions

Several other techniques can be used to obtain full-colour graphics ability while losing less memory to screen ram.

One example is reconfiguring the 6845 CRTC to believe that a screen mode is actually shorter than it is. For instance a three-quarter length Mode 2 is possible, giving a 16-colour text area of 20 by 24, graphics area of 160 by 192 pixels, and using just 15k of ram. Another is to use machine-code interrupts to change the screen display variables part way through a scan, thereby giving an impressive illusion of split screen modes.

A popular combination is that of Modes 4 and 5 which couples colourful graphics with 40-column text where required.

Successful use of techniques like these has been made in several pieces of commercial software: Both were used in the 8-bit version of E-Type, the first alone in Spycat and variations of the second in Elite, Crazee Rider and Genie to name but a few.

These and all the other possible methods, however, are based on reprogramming the 6845 CRTC controller. That is not a problem, except for the fact that the Electron is fitted with a ULA instead and so these methods don't work.

Limitations

As the programs use undocumented methods to achieve their goal, certain commands will not function as you would expect.

For instance, *VDU 26* will not restore the text X-axis maximum to the new – modified – value and *VDU 28* does not prevent text windows with limits outside of the new display area being defined.

CLS restores the original mode from which the pseudo-version is constructed. So to retain the new modes characteristics after clearing the screen all the registers must be reset.

Mode	Text characters	Graphics pixels	Colours available	Memory used
A	10 x 32	80 x 256	16	10k
B	20 x 25	n/a	4	8k
C	10 x 25	n/a	16	8k

How it works

Each program redefines several registers in the screen data information store located in page three of memory. The locations changed and their meanings are given below.

Location	Variable stored
&30A	Maximum x co-ordinate
&34F	Bytes per character
&360	Number of colours (minus one)
&361	Pixels per byte (minus one)
&362	Left colour mask
&363	Right colour mask

Mode A program:

```
 10 REM Mode A
 20 REM by Stephen Wade
 30 REM (c) The Micro User
 40 MODE 5
 50 *FX 154,224
 60 ?&30A=9
 70 ?&34F=32
 80 ?&360=15
 90 ?&361=1
100 ?&362=170
110 ?&363=85
120 VDU 20,30
130 END
```

```
 10 =    0 0       80 = 8B85 A
 20 =    0 0       90 = 25EF 9
 30 =    0 0      100 = B151 2
 40 = 30D0 0      110 = AAC1 4
 50 = 3942 D      120 = 56B4 1
 60 = 5B76 A      130 = FD2E 8
 70 = BC6F 0
```

Mode B program:

```
 10 REM Mode B
 20 REM by Stephen Wade
 30 REM (c) The Micro User
 40 MODE 6
 50 *FX 154,196
 60 ?&30A=19
 70 ?&34F=16
 80 ?&360=3
 90 ?&361=0
100 ?&362=136
110 ?&363=17
120 VDU 20,30
130 END
```

```
 10 =    0 0       80 = 329D F
 20 =    0 0       90 = 35CE 0
 30 =    0 0      100 = 1D53 7
 40 =   B3 3      110 = 301B 1
 50 = 9CAA A      120 = 56B4 F
 60 = B34D 3      130 = FD2E 5
 70 = 9A89 E
```

Mode C program:

```
 10 REM Mode C
 20 REM by Stephen Wade
 30 REM (c) The Micro User
 40 MODE 6
 50 *FX 154,224
 60 ?&30A=9
 70 ?&34F=32
 80 ?&360=15
 90 ?&361=0
100 ?&362=170
110 ?&363=85
120 VDU 20,30
130 END
```

```
 10 =    0 0       80 = 8B85 5
 20 =    0 0       90 = 35CE C
 30 =    0 0      100 = B151 2
 40 =   B3 3      110 = AAC1 6
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 70 = BC6F A
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Run on regardless...

Does your Archimedes suffer from egocentric programs? Steve Turnbull provides the therapy for cure and prevention

HAVE you ever bought a commercial or PD program and got an error message like *File not found* – or worse have the machine lock up – when you tried to run it? If you have, the chances are that you own a hard disc, but it can happen even if you don't. So what causes it? How do you get round it? And what can programmers do to avoid it?

Before we get down to the nitty-gritty there's some background information that's needed to make the whole picture clear.

All the different filing systems you might have in your machine – ADFS, RamFS, DeskFS, ArcFS, SCSIFS, IDEFS and so on – are controlled by the Filer. And it's this that looks after the directory windows and provides the upper level of interfacing.

The Filer sets up a default filing system and a default drive when it is initialised by switching on. The information for these is held inside the permanent CMOS ram. You can set these options by using the *Configure command or check it with *Status.

In a new machine the settings are for drive 0 of the ADFS. There's also a default directory but this is always the uppermost – $ – directory of the current filing system and drive.

The default filing system and drive are the ones used when a filing system and drive are not declared in a load or save command. This is easy enough to illustrate: Put a disc into the floppy drive of your machine, hit F12 and try the following commands:

```
*Basic
NEW
10 REM program
*adfs
*drive 0
SAVE"prog1"
SAVE"NoSuchDir.prog2"
*drive 3
SAVE":0.$.prog3"
*DeskFS
SAVE"adfs::0.$.prog4"
```

Having entered Basic we create a one line program then set the default filing system to ADFS and the default drive to 0. So the first SAVE works fine. The save for *prog2* fails because a non-existent directory has also been specified – the full save path in this case would be *adfs::0.$.NoSuchDir.prog2*.

The default floppy is then set to drive 3, but the next command overrides the drive number and still saves to drive 0. In the final example we set the desktop filing system as the default, but this time the command overrides the filing system as well so the save is still successful.

If you have a different default filing system and drive either reset your machine now or enter commands to go back to your usual defaults, something like this:

```
QUIT
*idefs
*drive 4
```

Let's see how the default directory fits into this: It might contain a string which looks like this:

```
Games.Develop.!Fred
```

In this case there's no filing system or drive specification so if a save is performed such as:

```
SAVE"!RunImage"
```

it will be saved on the default drive of the default filing system in application !Fred which can be found inside directory Develop inside directory Games. Alternatively the command:

```
SAVE"Resources.CodeSource"
```

will save into a directory inside !Fred called Resources.

You can use the directory command to override the drive used by including a drive specification in the directory command:

```
*dir :0.Games.Develop.!Fred
```

Now it will save to drive 0 even if the default drive is 4. Likewise you can override the default filing system with this:

```
*dir adfs::0.Games.Develop.!Fred
```

What's gone wrong?

So what is it that egocentric programs do that's wrong? Well, there are a number of situations: The first is to assume that the program or application is in the top level of the drive, in the $ directory. For example let's say the !RunImage of application !Fred needs to load a library called RunLib contained in a sub-directory called Resources. The file structure might look like this:

```
!Fred  !Boot
       !Run
       !RunImage
       !Sprites
       Messages
       Resources  RunLib
                  Code
       Sprites
       Templates
```

The command in !RunImage could be:

```
LIBRARY "!Fred.Resources.RunLib"
```

If !Fred was placed in the $ directory of the default drive on the default filing system there'd be no problem because the Filer would look in the right place for the file – say, *adfs::0.$.!Fred.Resources.RunLib* – but this usually won't be the case. If !Fred is a utility and you have a SCSI hard disc you might put it in a directory called *$.Utilities*.

Here, the correct, full filename might be:

```
scsifs::4.$.Utilities.!Fred.Resources.Ru
nLib
```

but the Filer would look for:

```
scsifs::4.$.!Fred.Resources.RunLib
```

so you would get a *File not found* error.

The obvious solution is actually the other trap programs can fall into. Clearly, if failing to put the whole path name in is wrong, the solution is put the whole path name in.

No. It's just as bad. Let's say that !RunImage has this command instead:

```
LIBRARY "adfs::0.$.Utilities.
!Fred.Resources.RunLib"
```

and we decide we want it on our IDE ➤

Temporary fixes

If you have an egocentric program that insists on running from the top-level of a directory structure there are two solutions. If you have a hard disc keep it in a sub-directory and only promote it to the top when you need to run it.

Or keep it on a floppy disc and type:

```
*dir adfs::0.$
```

whenever you want to use it.

But bear in mind that if you have another badly behaved program it might not work once you've changed the current directory.

hard disc in the applications directory, what happens? Well, one of three possible things:

Perhaps we try to run the program by double-clicking it while the original disc is still in the ADFS drive. In this case the program will work, because it will load *RunLib* from the floppy disc.

But later we try running it again. This time there's no disc in the floppy drive, so we get the error message *Empty drive*. Or there is disc but it doesn't have a directory called *Utilities*, so the message is *File not found*.

So if this isn't the solution either, what can be done? The solution adopted by some programs is, in the !Run file, to alter the default directory using this command:

```
*dir <obey$dir>
```

Now what's this thing *<obey$dir>? More background is needed.*

There's a module in Risc OS called Obey, and it has one star command:

```
*Obey [<filename> [<parameters>]]
```

The file – called *filename* – should contain a list of star commands which the Obey module carries out one after the other. There is the option to include parameters but we don't need to worry about that.

When Obey is given a file of commands to execute the first thing it does is set a system variable – *obey$dir* – to the complete path name of the file. So if the file has the path:

```
adfs::0.$.Utilities.!Fred.!Run
```

the *obey$dir* will be set to:

```
adfs::0.$.Utilities.!Fred
```

By using this system variable with the appropriate command the current directory can be set to the directory of the file being executed by the Obey module.

Now the command in !RunImage can be altered to this:

```
LIBRARY "Resources.RunLib"
```

and the file will be found correctly every time, regardless of the default filing system, default drive or current directory. So obviously this is the right solution, isn't it?

Well no, it's a step in the right direction but there is a problem. What happens if two applications do it?

Let's say the first application sets the current directory to itself and while it's running has to load and save various files into itself. This goes along quite happily.

Then a second application is run and it sets the current directory to *itself*. Now the first application will start to load and save into the directory belonging to the second one and will probably crash with *File not found* errors. Or worse, you'll manage to save some data and at a later date come back only to find that it's disappeared – because it was saved to the wrong place.

The final solution

If the Obey module can use system variables why can't the application? No reason at all, in fact that is precisely what it must do in order to behave correctly. Just about the first active line in the !Run file must be this:

```
Set fred$dir <obey$dir>
```

This transfers the contents of *obey$dir* into *fred$dir* and from now on the !Fred application should use its own system variable when referring to anything within its directory.

So the LIBRARY command would become:

```
LIBRARY <fred$dir>.Resources.RunLib
```

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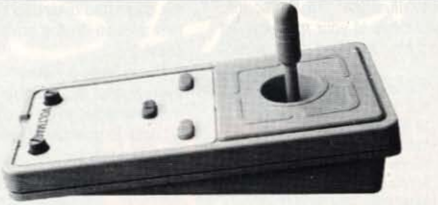

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THE MAD hatter

Bane Fire banished

WE are rapidly approaching the climax of *Adventure Quest,* as an awful lot happens very quickly from now on. Last month I left you on a bleak moor following that interminable fall from the Bridge of Khazad Wotsit.

One move west and three north will take you to a hilltop outside a barrow and you have some Orcs for company. Never mind them, just grab the brazier and the Star-stone which are also there. Now flee down, adding four moves south to make your getaway.

From here – on a bleak moor above swirling mists – go east and then down into a ravine, continuing to the bottom.

Now go south twice to the Stone Circle, where you'll encounter the feeding ghosts. They will start to drain your energy but dropping the brazier will soon sort them out.

Two moves east, three south and two west should land you outside the door of an ancient house. Go in and then south to the main hall where the vampire will be repelled by the holy halitosis caused by the garlic you ate in the first few moves of the game.

I can't help wondering how many adventurers ignored the onion – as it was then called – and so found themselves gnashing their teeth at this point.

Move up to the High Room and note that this is where the medallion and the stones need to be deposited for the time being. Wear the boots and go back out, making sure you have the sword: If you have left it somewhere, go back and retrieve it at once.

Go down, north and out, followed by two moves east, three north and another two east. Skeletal hands will clutch at you here, which is why you must have the sword. One further move east will bring you to the final stone, the Mist-stone.

Take it and make your way back to the High Room where you obtained the boots.

Here you should have the following items assembled: The medallion, the Earth-stone, Sun-stone, Star-stone and the Mist-stone.

Throw each of them out on to the small ledge and then follow them – using the input *Out* – and making quite sure you are still wearing the boots.

Carry the items two moves south, through the deadly quicksand, to the granite ramp at the foot of the Black Tower. Continue up the ramp and insert the Earth-stone into the rock door.

Now you can go in. The Sun-stone is for the gold door, the Star-stone for the silver door and the Mist-stone goes in the glass door.

You won't need the sword or the boots any more, so if they are still around you can dump them. When you have passed through the glass door you will be south of the Throne Room and will hear Agaliarept sneering away to himself: Wave the medallion here.

Now go north, east twice and north again, then open the door to alert the Orcs. Next move south, west, south and east into the alcove until the Orcs run past.

We are now into the home straight. West, north, east and north puts you back by the open doorway from which the Orcs emerged.

Go north through it and then down the stairs to the bottom of the pit. Agaliarept will be there, rabbiting on about something or other, and a move north causes the Phoenix to destroy the Bane Fire – and that's that. Out you go in a blaze of glory.

- *Next month I'll be starting a solution to the Magnetic Scrolls adventure Corruption.*

Dreaming dragons

Sit up and take notice, dear readers, for the dreaded secret of the M Doorways in **Castle Blackstar** is about to be disclosed. This is what Barbara Gibb has to say: M stands for maze and the two doorways are the entrances to the Checkerboard Room maze

One wrong move here results in you being unceremoniously dumped outside one of the doorways, while the lamp lands outside the other. Nasty touch, that – typical of all good adventures.

The route from one doorway to the other is, in fact, shaped like the letter M and it can be retraced. Thus the moves required from the first door are four north, followed by southeast and south to the treasure.

Take the chess and then go east, north, northeast and four times south to arrive safely at the other doorway.

Now go southwest, northwest and west twice before moving four times south to the well bottom. You can switch the lamp off here before you proceed up, east, north, three times east and northeast to enable you to enter the temple.

Drop the nugget, chess, painting, vane and ring here – and off you go once again.

Your moves now are exit, south, north, southwest and west so that you can take the knife before continuing west twice, north and down. Light the lamp here and then go down, west and bail out the boat.

Sail the boat to the still pool, then move south twice and southeast before bailing out the boat again. Moves to the cell block are as follows: South, east twice, down, take the boat and go west, northwest, down, northwest and northeast.

From here you must go west and north to where the troll is guarding the bridge: What would we do without them? However *don't* give him the coin: Waving the staff will bring about an artificial dawn and so the troll is turned to stone.

Now you can go east twice to the dead end and collect the gem. Ignore the message and the button for the moment and return instead to the cell block – two moves west and two south.

From here go east and up twice to the Square Room where you will find a star-shaped indentation.

Insert the gem and, although nothing appears to happen, go back down, up and north to the cell block, then west, north, east and east to the dead end. Read the lettering and – in spite of what it says – push the button.

Because of your activity here and in the Square Room, a trapdoor will precipitate you down to the Hexagonal Room – another maze.

Examining the drawing and the clock together will give you the correct route through the maze. Take the clock and go south, northeast, west and south through the complex junctions and then north to get back to the Hexagonal Room.

You will now hear a voice thunder: *You have solved the puzzle of the star* and

Elite Affairs

For the sake of clarification, the name *Elite* will be reserved for the version that runs on the BBC B, B+ and Master while *ArcElite* will specify that for the Archimedes. That way, I hope readers won't get confused as to the particular features I am dealing with.

Steve Parker has written with some amusing observations on his version of Elite. He's in Galaxy 5, and has found this cluster of planets: Xevera, Rich Industrial, Corporate State, Tech Level 15 together with Edrebi, Average Agricultural, Level 5, Anarchy and Ladigeso, Poor Agricultural, Level 1, Anarchy.

So far so good – a nice little proposition so far as trade and combat are concerned.

Here's where the fun starts: Ladigeso is only 0.4 light years from Edrebi, and trying to locate it from Xevera always results in Edrebi being chosen.

The only way to get there, it would seem, is when you are in flight: Move the cursor over Ladegiso, hyperspace, and keep your fingers crossed.

Steve then docked at Ladgieso (note the change of spelling) and saved his commander file and did a spot of renaming. On loading the commander once more he turned out to be at Edrebi. So he launched for Xevera again and, on docking, found that while his hyperspace was set for Xevera his computer alleged that he was, in fact, at Asoat.

Expensive research determined that the planet Asoat was not to be found in the records of any galaxy. Curiouser and curiouser, as Alice was wont to say. I've had a long and interesting letter from Andrew Cawte on his experiences with ArcElite. He'd completed four missions when he wrote and he has some observations well worth passing on.

First and foremost, it looks as though Mission One can only be triggered in the Santaari galaxy, so if you haven't been asked by GalFam to save Xeaan from starvation and you have chalked up around 250 kill-units and have a reasonable amount of wealth, pop back to Santaari to achieve fame but no fortune.

Andrew has also encountered my hairy friend Zartid, who really does need wiping out: Trouble is that Zartid flies an energy bomb-proof ship which has incredibly tough shields and a fearsome rear laser.

There's also the small matter of six or so Mamba escorts – and more can be summoned to help.

Zartid also has (though Andrew didn't mention this) hyperspace capability and his shields are rechargeable. All in all, this is one mean cookie.

Here are some of Andrew's tips: Take out the escort with your energy bomb, hit Zartid as hard as possible with your military laser until he shoots back, then get out of his way while you rest your laser before going for him again.

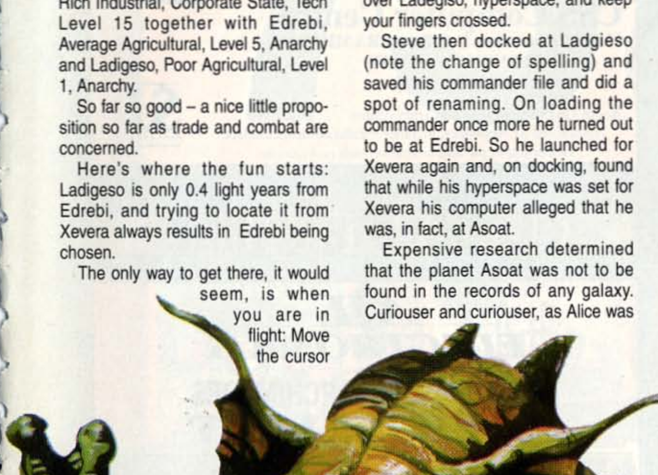
Keep this up until he missiles you, and the end is almost nigh. It took Andrew 10 attempts to do it: It took me more and I'm not ashamed to say so.

Other tips for dealing with Zartid: It is possible to hit him with a missile, but you have to be awfully close to do so. Another tactic my son David used was to keep turning inside him while hitting him steadily with laser fire.

If all else fails, try joining a police patrol and let them help you when the encounter finally takes place. I'll pass on Andrew's comments about the other two missions in a future column.

James Nott is Deadly, is quite well off and has completed two missions on Elite. He wonders if there are any more missions and how to get the cloaking device, the ID system and the retro rockets.

The answer, I'm afraid James, is that you have carried out all the missions available on the BBC Micro and that the equipment you refer to is a feature on the Atari version of Elite.



you are now transported to a laboratory. Don't linger, just grab the vial and move east.

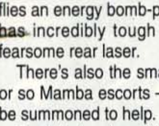
You will now be in the Warm Room – note the pit – and go east to discover the source of the warmth.

Throwing the vial will put the dragon to sleep but, Barbara warns, if you rely solely on soporifics, you will be in for a rude awakening (the reverse actually) later on. So, remembering that the knife was named Smaug's Bane, use it to kill the dragon.

Next moves are east twice, northwest and west to the river bank where you should drop the boat. Now go east and north to the Throne Room, north and down to the rockfall where there is a sword in a stone. If you wear the crown you can take the sword.

Up twice from here brings you to the stables, so exit and turn off your lamp. Six moves east and one northeast bring you to the Temple. Enter it and drop the staff, clock, sword, gem, sceptre, knife and crown and make yourself a nice cup of tea.

(*To be concluded.*)



Hatter's Helpline

David Radford is stuck in one of my favourite adventures Fish! – he's all tied up in the Smooth Warp, though he's got the general idea of what is needed.

First you go to the smithy and while there you should open the cupboard and the cage and then go out again. An alternative here is to grab the cage, take it out and then open it.

Either way the parrot will leave the cage and then explode. Don't waste time, though.

Now get everything from the cupboard and wear the asbestos gloves. Go back to the clearing and get the disc and then return to the smithy where you should put the disc in the crucible, hold it over the fire with the tongs and then fill the mould with the melted gold.

Now go to the cool glade, wait until the mould has cooled and then break it with the hammer. You'll find that you have made a ring. Take it and that's that.

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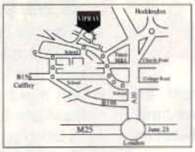
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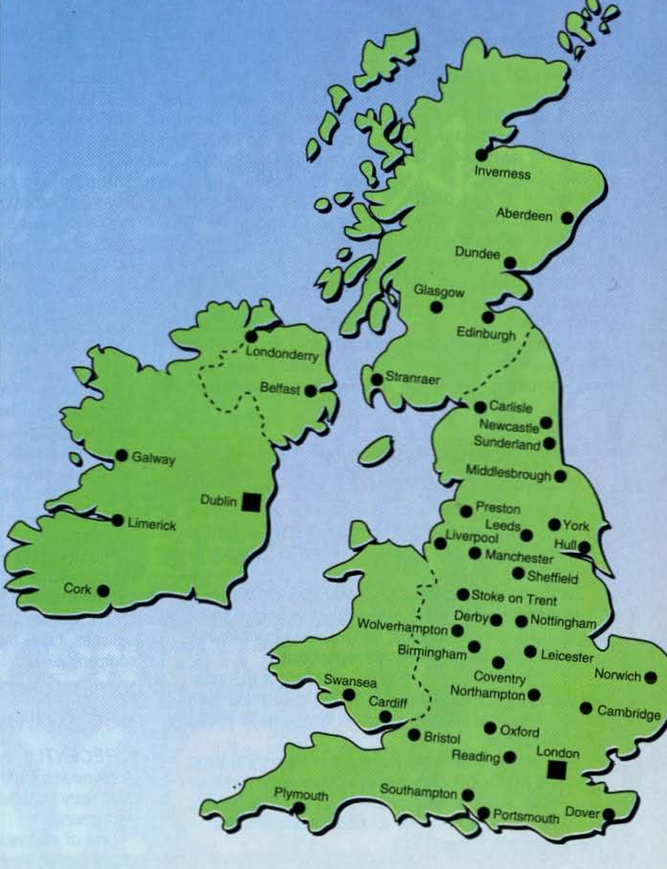
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Chuck it

In the April issue Rom wanted to know how to get past the Triceratops in Chuck Rock – well I know how.

You need to hit him with the rock from the top platform 11 times like this: While the Triceratops is stampeding to the right of the screen, quickly walk off the top platform so that you land just to the left of the rock.

Pick this rock up, quickly walk left and jump on the ledge, then walk to the edge of the screen. Turn right and throw the rock on the top platform. Then jump up, pick up the rock and stand in the middle of the platform. Throw the rock when the Triceratops begins to run left, not at any other time.

You then repeat the process until the Triceratops drops. Good luck. – **Stephen Scott, Englefield Green, Surrey.**

Super service

OLD fashioned service is not dead. I recently bought a copy of Top Banana from a local Acorn dealer as a present for my daughter's 10th birthday.

At first she was disappointed to find that the advertised free T-shirt offer only applied to mail order sales. However, a letter to Hex, the producers, resulted in a T-shirt by return of post.

It is encouraging to see there are still companies out there who believe that keeping the customer happy is good business. – **Tony Spence, Macclesfield, Cheshire.**

Bookworm

I NEED a book which gives details of the Archimedes' hardware registers inside the computer's memory. I already own the Programmer's Reference Manual but this is of little use for writing games. Is there a suitable book for my problem? – **Steven Haggerty, Colne, Lancs.**

● You could probably get the information you need from the Acorn Service manual, but you really shouldn't try to approach games writing at this level.

You don't need to know how to program the chips in order to write good games, and if you do alter things at the hardware level your program is unlikely to work on new machines.

Coin-Age have started a disc-based magazine just for writing games – Power to the Programmers – which, they say, gives lots of the "secrets and tricks of the trade from the professionals". It costs £1 from: Coin-Age Ltd., 1st Floor, 23 Cooper Street, Nelson, Lancashire BB9 7XW.

Altering Arachnoids

IN the March 1992 issue of Micro User *you printed Arachnoids. Unfortunately it uses the X key which is broken on my micro. Is there any way to alter the keypresses?*

Also, how do you use the checksum programs? – **Tim Edwards, Derby.**

● Line 190 is what you want, as that sets variables to values which recognise the movement keys. Variable *ml%* moves you left and *mr%* takes you right. They're given the values of the INKEY needed: -98 and -67 respectively.

If you want you can change things so C takes you left and V takes you right. Rewrite line 190 so that *ml%=-83* and *mr%=-100*. If you want to be really idle, leave 190 alone and add:

```
195 ml%=-83: mr%=-100
```

Of course whichever way you do this the checksums will be different. Full details of the checksum program and how to use it are given in our February 1992 issue.

CD Rom comment

IN this issue you'll find a lot of information on CD Roms including the great offer of a complete A5000-based CD Rom system for £1,799 (ex VAT), or an A3000 upgrade kit for £599.

But this very reasonable offer is only available to educational establishments. We asked Acorn why they didn't make it available to everyone, and we were informed that in their opinion no one else would be interested.

We, at The Micro User, *disagree and believe that making this offer, or a similar one, available to all would, with proper promotion, result in a tremendous surge in A5000 and A3000 sales.*

If you would be seriously interested in buying either the complete A5000 CD Rom system, or an upgrade kit for your A3000, A300 or A400 machines, at a similar price to those above, why not write to Acorn and tell them. – **Steve Turnbull, Editor**

Blinking blanks

PLEASE can you help an amateur from going completely mad. I possess an A3000 and a Citizen Swift 24 printer. I have no problems with 1st Word Plus, but when I use Acorn DTP or Clares' Rhapsody the printer will insist on giving me an extra form feed. Consequently I either have to waste a sheet of paper or laboriously wind the paper back.

What am I doing wrong? – **C. H. Hutt, Chester.**

● Actually it isn't your fault. The programs themselves have been configured to do this so you always start at the head of a page rather than halfway down where your last call to the printer left things.

Of course if the last print you did left things nice and tidy the form feed is still sent, giving you that frustrating blank page. The reason you're getting different results with 1st Word Plus is that it deals with printing in a different way to the other two programs, because it's a conversion from other machines.

You could try altering the configuration of !st Word Plus so that it has the same problem and then altering the switches inside the printer to compensate.

A5000 colour

I RECENTLY bought an Archimedes 5000 and have been very impressed with its performance.

One of the reasons that I chose it over the other Acorn machine – and for that matter over IBM compatibles – was for its speed and ease of manipulation of sprites. My main interest lies in image processing, so I would like to use the A5000's 256 colour modes for the display and processing of sprites.

Unfortunately, using the POINT(x,y) function I cannot read all 256 colours: Only four colour values are returned.

A colleague suggested using the TINT(x,y) function in conjunction with POINT(x,y). This results in the same four colours being returned.

Is there a way of reading all 256 colours from screen, or, failing that, accessing the screen memory to perform the same task? – **Peter Brown, Benfleet, Essex.**

● If you're only getting four colours when using POINT(x,y) I'm afraid you must be doing something wrong. However handling 256 colour modes isn't that easy because Acorn were forced to maintain compatibility with the older 8-bit machines.

Because of the earlier design only 64 colours (using six bits) can be defined in the COLOUR and GCOL commands this leaves two bits which need to come from somewhere to make up the full 8-bit colour definition. This is where the TINT command comes in.

It allows you to specify the other two bits which are then applied to all colour definitions until the next TINT is issued. The tint is the amount of white added to a colour and has four values: &00, &40, &80 and &C0. So an instruction T%=TINT(X%,Y%) will yield one of the four values.

The command

```
C%=POINT(X%,Y%)
```

will give the 0..63 colour. This short program illustrates how the commands work:

```
10 REM Colour test
20 MODE 13:OFF:*Pointer 1
30 FOR Z%=1 TO 200
40 GCOL 0,RND(64)-1 TINT RND(25
6) AND &C0
50 CIRCLE FILL RND(1024)-1,RND(
1280)-1,RND(100)+200
60 NEXT
70 REPEAT MOUSE X%,Y%,B%
80 PRINTTAB(0,0)POINT(X%,Y%)TIN
T(X%,Y%)
90 UNTIL0
```

BOS update

PLEASE could you tell me how to convert the BOS Basic editor and syntax checker to run on a Master. I found this utility very useful when I had a BBC B and I was disappointed when it would not work on my new computer. – **D. G. Edwards, East Wittering, Sussex.**

● Unfortunately BOS was written well before the Master came along and it uses some very naughty techniques. But we'd be interested to hear from anyone who's done the conversion.

Micro expansion

I HAVE recently bought an issue four BBC Micro and I would like to expand it. However my local shops say that the BBC Micro is obsolete. What's your view? – **C. T. Blake, Skelton, Cleveland.**

● The BBC Micro is old but not necessarily obsolete. Eight bit problems only need eight-bit solutions and the BBC Micro is still a sturdy and reliable workhorse – hence the thriving trade in second-hand machines.

As for expanding it have a

Teletext options in Basic

PRIZE letter

I WONDER if Alan Clement (April Letters) has considered the option of copying broadcast teletext graphics and text into his own Basic programs.

Any page displayed on screen in telesoft mode can be copied in part, or whole, into Print statements using the cursor and copy keys.

It is best to set up a function key to display the page on demand as in:

```
10 *KEY0 *DISPLAY 7000|M
20 *CH1
30 *PAGE 100
40 *TRANSFER   7000
```

Run this program, press Break and load your own Basic program. Press F0 to display the teletext page and then copy the chosen line into a numbered Print statement.

Subsequent lines can be treated in the same way but make sure the graphics control codes are included by starting the copy cursor one character to the left of that which you wish to copy.

Remember that copyright applies to Ceefax and Oracle broadcasts. – **Ian Bunting, London.**

look at our advertisers, starting with Watford Electronics. You'll find that there are still plenty of things you can add to your machine.

And there's no doubt at all that the experience you gain from your BBC Micro will stand you in good stead for when you move on to a more modern machine.

Core problem

I'VE been experiencing problems with First Word Plus. From time to time when double clicking certain files – they seem to be the same ones, but do not always produce the problem – it responds:

```
No stack for trap handler: pc =
    00000048: registers at
                 000370b4
```

Clicking the cancel box reveals:

```
Filecore in use
```

The First Word Plus icon disappears from the icon bar and any files left open on the screen are lost. After this no amount of pointing or clicking will return anything but Filecore in use *and the only option left is to switch off and reload First Word Plus again.*

One strange phenomenon is that some days it does not happen at all but on other days it seems to be very prevalent – **M. A. Burton, Waterlooville, Hampshire.**

● We haven't come across this problem. Assuming it isn't some obscure *feature* of First Word Plus we think you may have either a corrupt disc at work here or possibly an alignment problem with the A3000's internal disc drive. This could force 1st Word Plus into an error when reading the files.

Electron lives on

I WISH to complain about Steve Turnbull's article Going on Ten *in the March 1992 issue of* The Micro User. *After owning an Electron for eight years I have finally bought an A3000, however I still enjoy using my Electron.*

In his article it says that in August 1983 the Electron was launched, subsequently was a failure and so was discontinued. I would like to point out that one Christmas the Electron outsold the BBC Micro.

The Electron is more popular than the BBC Micro with users and still has a devoted and loyal user group as well as software groups supporting it such as Pres and Slogger. – **William Cooke, Sandy, Beds.**

● The comment about the Electron being a failure was not a criticism of the Electron or any owners, but was pointing out that the machine was a commercial failure for Acorn and contributed to their difficulties when the micro-boom bubble burst.

Disc defects

I HAVE an STL 1770 DFS and several times I have been unable to run or verify my monthly disc. But Europress Direct have always replaced them without question and the second one usually works.

*Having problems this time I started to investigate and found the disc would run on certain machines at college. Back home I discovered that the command *DSTEP solved my problem.* – **C. A. McGaughey, Canterbury, Kent.**

● Thanks for the feedback. The discs can suffer from damage in the post so naturally Europress Direct will always replace them if this happens.

Elite update

I READ with interest the review of Archimedes Elite in March's Micro User. *It said that if the program was installed on hard disc the trading prices were set to zero and no cargo was available. When I installed Elite on to my A5000 hard disc I had no such problems – it behaves normally.*

Also, in the mission which involves the disposing of a traitor, the special ship is actually accompanied by a wing of Mambas.

While on the subject of Elite, there is in fact a cheat for the Archimedes version which allows you to alter the status of your commander and the equipment on your ship. The software, by Mark Lisher, is public domain. – **M. I. Crankshaw, Cambridge.**

● Thanks for pointing out our slip in the Elite review – the problem occurred on a pre-release version. You're quite right.

Misleading mismatch

I RECENTLY typed in a 6502 program from your April 1988 issue. It gives you password entry to a booted disc.

Unfortunately I got the error message Type mismatch at *line 720. After I checked I found that I had indeed typed it in correctly. Is there a mistake in the program?* **Adrian Montague, Truro, Cornwall.**

● The program is correct, it's just that you've got a misleading error message. Line 720 defines a procedure *PROCos* which is called from lines 700 and 710. You've almost certainly mistyped one of these lines which call *PROCos.*

The error message points to where the procedure is defined, not to where it is wrongly called from. Function calls can give the same problems.

ALL programs printed in this magazine are exact reproductions of listings taken from running programs which have been thoroughly tested.

However, on the rare occasions when mistakes occur corrections are published as a matter of urgency.

Should you encounter error messages when you type in a program, they will almost certainly be the result of your own typing mistakes.

Unfortunately we cannot answer personal programming queries concerning these mistakes. Of course letters about suggested errors will be investigated without delay, but any replies found necessary will only appear in the letters pages.

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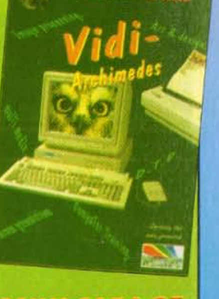

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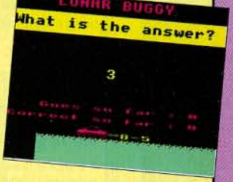

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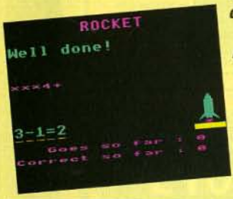

All the programs are designed to be flexible and to suit individual ability and learning speeds. To this end there is a full range of options to customise these programs to enable you to enhance your skill and improve your knowledge of mathematical principles.

COUNT! ONLY costs £8.95 and is available on disc for the Master Compact/Electron/Archimedes (3.5in disc) or BBC B/B+/Master (5.25in 40t or 80t disc)

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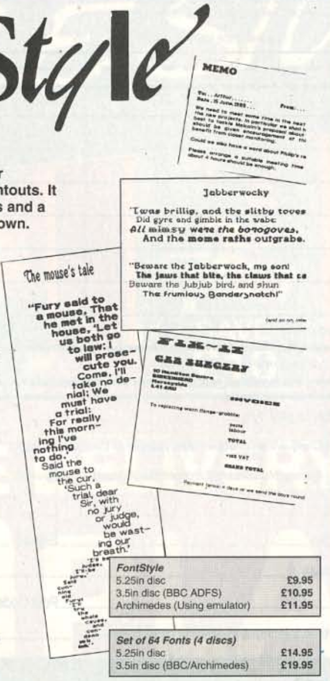

MEMO

Jabberwocky

'Twas brillig, and the slithy toves
Did gyre and gimble in the wabe:
All mimsy were the borogoves,
And the mome raths outgrabe.

"Beware the Jabberwock, my son!
The jaws that bite, the claws that ca
Beware the Jubjub bird, and shun
The frumious Bandersnatch!"

The mouse's tale

"Fury said to
a mouse, That
he met in the
house, 'Let
us both go
to law: I
will prose-
cute you.
Come, I'll
take no de-
nial; We
must have
a trial:
For really
this morn-
ing I've
nothing
to do.'
Said the
mouse to
the cur,
'Such a
trial, dear
Sir, with
no jury
or judge,
would
be wast-
ing our
breath.'

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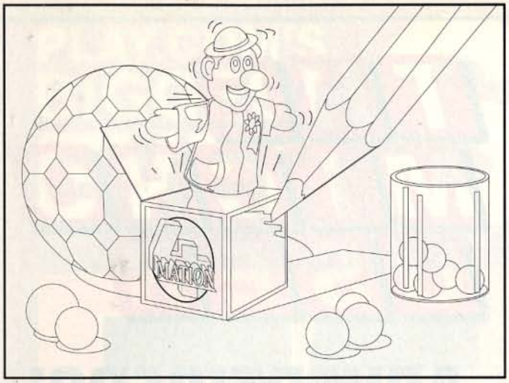

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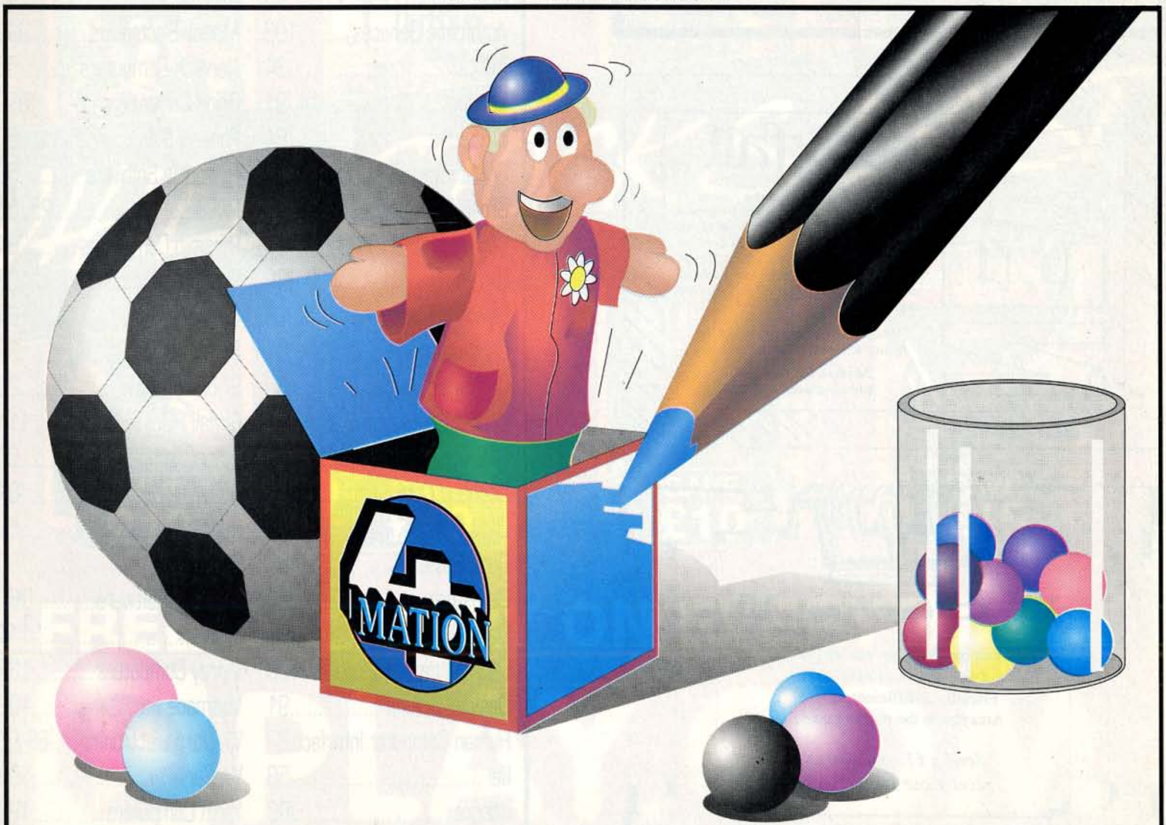
Draw file coloured using Chameleon



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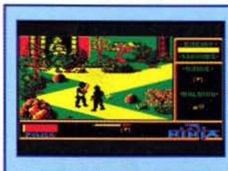

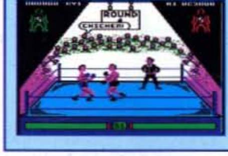

PLAY IT AGAIN SAM 12

The Last Ninja - Martial arts and cunning strategy at Lin Fen island. Fight with swords, numchukas and shurikens stars through six fiendish levels.

By Fair Means Or Foul - A realistic and entertaining boxing simulation for 1 or 2 players. You can even cheat...if the ref's not looking!

Skirmish - A brilliant, full-feature version of the classic joust game with beautifully animated sprites. For 1 or 2 players.

Blagger - A much-improved version of the classic platform and ladders game, with 20 tricky, but highly amusing levels.

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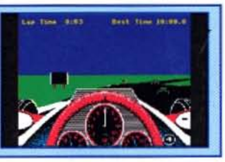
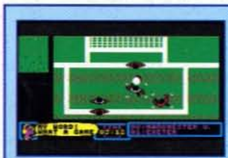
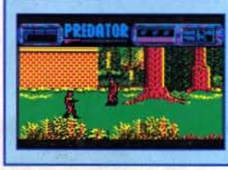
The most realistic of racing simulations with an impressive degree of control over a range of vehicle factors and driving controls. Includes Silverstone, Brands Hatch, Donington Park, Oulton Park and Snetterton. Simply the best! (No Acorn Electron version available.)







PLAY IT AGAIN SAM 14

Superior Soccer - An action-packed arcade game for 1 or 2 players, or a challenging management game, or you can play a combination of both!

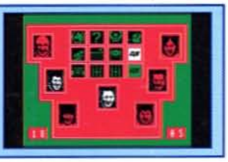
Predator - Based on the Schwarzenegger film. Fight your way through the dense South American jungle, but beware the deadly alien...

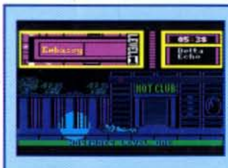
Ballistix - The fastest, wackiest, toughest computer ball game, for 1 or 2 players. Over fifty different action-packed screens.

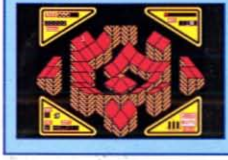
Star Port - A sixty screen arcade adventure, with letter-puzzle levels. Try to rescue the medical supplies from the strange, triangular, space port.

A QUESTION OF SPORT

The home computer version of the very popular BBC television sports quiz. Six exciting rounds, including **Pictureboard**, **Mystery Personality**, **Quickfire** and **What Happened Next?** Pit your wits against your family, your friends or your computer.







PLAY IT AGAIN SAM 16

Hostages - Commando action and strategic planning. Place your snipers, then abseil into the besieged Embassy to search for and rescue the hostages.

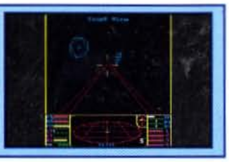
Vertigo - Balance your way around fifty different weird and wonderful structures to capture the diamonds. Highly frustrating and addictive.

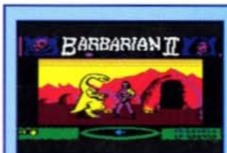
Perplexity - A 3-dimensional strategy game for all Repton and Pacman fans. Puzzle your way through 16 graphically brilliant mazes.

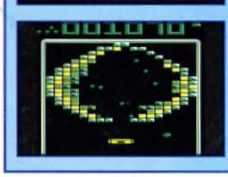
Pipemania - The highly praised, classic, puzzle game for 1 or 2 players. Try to join the pipes and let the flooz flow, as the time runs out...

ELITE

The unique and widely acclaimed 3-D space trading and combat game. The highest-selling game ever for BBC Micro/Master and Electron computers and, after nine years, still as enthralling and addictive. If you only ever buy one game for your computer, then this must be it!







PLAY IT AGAIN SAM 13

Barbarian II - Fighting skills and strategy as you enter the Dungeons of Drax. Explore four puzzling levels and defeat twenty different gruesome monsters.

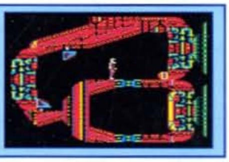
Hyperball - A superb 120 screen version of the classic bat-and-ball game. Includes aliens, 8-ball splitters, cannons and weapons' purchase.

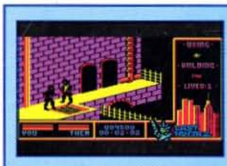
Pandemonium - Eighty screens of fun and arcade adventure action as you build the core. Featuring teleport machines, moving floors and weird aliens.

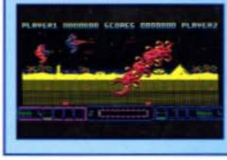
Percy Penguin - The classic penguin game. Percy must kill the Snobees by hurling ice cubes at them... but deadlier breeds then appear.

EXILE

An enormous arcade adventure featuring strange alien creatures with realistic movements and actions. Pick your way through a massive, flooded cave system, solving complex puzzles along the way. Have you the skill, cunning and endurance to conquer the evil world of the Exile?







PLAY IT AGAIN SAM 15

Last Ninja 2 - The Last Ninja is back with a vengeance! Battling against the evil Kunitoki in the streets, sewers and offices of downtown New York.

Cyborg Warriors - A multi-level sideways scrolling shoot-em-up, with robots and giant monsters to shoot and weapon upgrades to collect.

Network - Shoot your way through more than 100 action-packed screens, with teleporters, lifts, springs, robots and lots, lots more.

Ricochet - A massive, puzzling arcade adventure with brilliant graphics. Five completely different levels, from ancient Rome, to futuristic space.

PLAY IT AGAIN SAM 12 PLAY IT AGAIN SAM 13 PLAY IT AGAIN SAM 14	BBC Micro/Master 5 1/4" disc ....£11.95 BBC Micro/Master cassette..................£9.95 Master Compact 3 1/2" disc.............£14.95 Acorn Electron cassette £9.95
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